Environmental Assessment for an Elk and Youth Waterfowl Step-down Hunt Plan on the Turnbull National Wildlife Refuge

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1.0 PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

The Refuge was established by President Franklin D. Roosevelt in 1937, through Executive Order 7681, as a refuge and breeding ground for migratory birds and other wildlife. Local activists, sportsmen, and naturalists were instrumental in obtaining the area's designation as a National Wildlife Refuge. The Refuge was named after early settler Cyrus Turnbull, who built a cabin on the north end of Turnbull Slough and lived there with his wife and children from 1880 to 1886.

The Refuge constitutes approximately 16,000 acres within a globally unique geological area known as the Channeled Scablands, created by massive scouring from Ice Age floods 15,000 years ago. An extensive complex of deep permanent sloughs, semi-permanent potholes and seasonal wetlands formed in the depressions left in the scoured landscape, while soils only centimeters thick on upland sites, support primarily ponderosa pine intermixed with grasslands (steppe) and exposed basalt cliffs. Aspen is scattered throughout the area. The juxtaposition of all these contrasting habitats in such close proximity is unique to the Channeled Scablands and creates conditions of exceptional wildlife and plant diversity.

The Refuge is managed by the U. S. Fish and Wildlife Service (Service) and is one of more than 545 National Wildlife Refuges in the United States.

The goals of the Turnbull National Wildlife Refuge, as revised in the Comprehensive Conservation Plan (USFWS 2007) are:

Goal 1: Contribute to protection of local watersheds to maintain adequate water quality and quantity for native Refuge wetland species.

Goal 2: Provide habitat conditions essential to the conservation of birds and other wildlife within a variety of wetland complexes.

Goal 3: Restore Refuge aspen and ponderosa forest to a natural distribution of stand structural and successional stages to benefit forest dependent wildlife.

Goal 4: Protect and restore the natural distribution and diversity of grassland and shrub steppe habitats to benefit wildlife.

Goal 5: Support the conservation of threatened and endangered species in their natural ecosystems.

Goal 6: Support the maintenance of biologically effective landscape linkages and corridors between the Refuge and other intact areas of vegetation zones representative of this ecoregion.

Goal 7: Foster appreciation of and support for the Refuge and the Channeled Scablands ecosystem through quality environmental education, interpretation, wildlife-dependent recreation, and outreach compatible with the Refuge purposes and mission.

Goal 8: Encourage and support research that substantially contributes to our understanding of the Channeled Scablands ecosystem.

A variety of management practices are used to achieve these refuge goals. These practices include both manipulative and administrative actions that will be applied over the next 15 - 20 years. Manipulative actions include restoration of fire through prescribed burning, tree removal utilizing a variety of silvicultural methods, noxious weed control, livestock grazing, water management, wetland restoration, and riparian and grassland vegetation restoration. Public use management practices include development of a driving tour route, trails, viewpoints, photography blinds, and interpretive and environmental education facilities within a designated Public Use Area and implementing compatible hunting programs. Administrative actions involve increased coordination with other public agencies and private landowners to protect the quantity and quality of water entering the refuge and prevent the further isolation of the Refuge resulting from increased urbanization of landscape linkages.

1.2 PROPOSED ACTION

The Service is proposing to initiate an annual, safe, high quality, walk-in, limited-entry elk hunting program and a safe, high quality, low-impact youth waterfowl hunt on the annual State youth hunt weekend beginning in 2009. These hunts are proposed to meet goals and objectives identified in the Final Comprehensive Conservation Plan (CCP) and EA (USFWS 2007). This environmental assessment is tiered from the 2007 CCP and EA and addresses the site specific and cumulative effects associated with opening the Refuge to these two hunt programs.

As stated in the CCP the elk and waterfowl hunts will have the following attributes:

Elk hunt

• High quality: uncrowded conditions with less than 2 people per square mile and <10 percent of hunters report feeling crowded. In addition, at least 80 percent report satisfaction with their hunting experience.
• Walk-in: vehicles are left in designated parking areas; there is walk- in/walk-out access only; and no motorized or equestrian retrieval is permitted.
• Safe: no firearm related injuries or safety incidents and 98 percent of all hunters report feeling safe.

Youth Waterfowl Hunt
• Emphasizes education, possibly requiring a waterfowl identification or natural history class for youths participating in the hunt.
• Safe: no injuries or safety incidents; 98 percent of all hunters report feeling safe.
• High quality: uncrowded conditions (hunters spaced at 300 yards or more) and minimal conflicts with other priority public uses.

• Low-impact: limited vehicle access; designated stationary hunting areas on the north side of Upper Turnbull Slough; no boats; and walk- in/walk-out access.

1.3 PURPOSE AND NEED

The purpose and need for these hunts were outlined in the Final Comprehensive Conservation Plan/EA completed in 2007. The general effects of opening these hunts on the Refuge environment were analyzed in the 2007 Environmental Assessment (EA). A Finding of No Significant Impact (FONSI) was issued following review of the EA and the preferred alternative was adopted as the course of action for the Refuge for the next 15 years. Since completion of the CCP a draft hunt plan for the Refuge was completed that includes additional detail for the 2 hunts, including the seasons to be open and the number of permits to be issued per season, as well as the final hunt unit boundaries and placement of necessary infrastructure (blinds, parking areas and access points). This tiered Environmental Assessment analyzes the more specific effects of opening these two hunt programs given the additional detail provided in the draft Hunt Plan. This EA also includes an expanded cumulative effects analysis developed in response to the Fund for Animals lawsuit against the Service on March 14, 2003, alleging noncompliance with the National Environmental Policy Act (NEPA) in opening 37 refuges to hunting during the 1997-98 through 2002-03 seasons. On August 31, 2006, the U.S. District Court Judge granted plaintiff's motion for summary judgment agreeing that the Service did not adequately consider the cumulative impacts of opening these refuges to hunting. The Service's October 5, 2006 brief asked the court not to enjoin the hunt programs while the Service proceeded to address the NEPA deficiencies in the original 37 hunting packages. In addition, the Service informed the court that by May 30, 2007, it would also correct NEPA deficiencies for the refuges opened to hunting since the lawsuit was filed. Turnbull NWR falls within this latter group.

1.4 OTHER ENVIRONMENTAL DOCUMENTS

The Turnbull NWR CCP and EA (USFWS 2007), Waterfowl and Elk Hunting Compatibility Determinations, Appendix E.3 and E.4 in the CCP and EA (USFWS 2007), Waterfowl and Youth Waterfowl Hunt Plan for Turnbull NWR (2008), and the Section 7 consultation (USFWS 2008) are herein incorporated by reference. These documents are available at the following website: http://www.fws.gov/pacific/planning/main/docs/wa/docsturnbull.htm

1.5 DECISION TO BE MADE

Based on the analysis documented in this Environmental Assessment, the Regional Chief of Refuges for the U.S. Fish and Wildlife Service Pacific Region will determine whether or not to initiate a limited entry permit only elk hunt and a youth waterfowl hunt on the Turnbull National Wildlife Refuge as described in the preferred alternative, and whether or not an Environmental Impact Statement (EIS) is necessary. If the Regional Chief determines that the hunting programs should be initiated and that an EIS is not necessary, a FONSI would be prepared, which would

highlight the alternative selected for implementation. Following the signing of the FONSI, the preferred alternative in this Environmental Assessment would be implemented.

1.6 ISSUES

The issues that have been identified by the Service to be important in the decision making process to implement an elk and youth waterfowl hunt are biological, social and economic in nature. No impacts would be expected on physical resources such as soil, water and air. The issues include impacts on; Rocky Mountain elk, waterfowl, wetlands, steppe, ponderosa pine and riparian habitats and their associated wildlife species; and human concerns about cultural resources, impacts to private land, recreation, and economics.

1.6.1 BIOLOGICAL ISSUES

1.6.1.1 IMPACTS ON ROCKY MOUNTAIN ELK

The primary issues regarding impacts to Rocky Mountain elk are direct effects associated with hunter harvest both on and off refuge and disturbance to elk that could potentially change the distribution of elk with regards to security zones created either intentionally or unintentionally.

1.6.1.2 IMPACTS ON WATERFOWL

Effects of the alternatives to waterfowl are through direct mortality resulting from hunter harvest and disturbance related to the public utilizing trails, viewpoints and EE sites and hunters walking in or adjacent to wetlands used in the fall by waterfowl.
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1.6.1.3 IMPACTS ON HABITATS AND ASSOCIATED NON-HUNTED SPECIES

The primary issues concerning the effects of alternatives on wetland, steppe, ponderosa pine, and aspen riparian habitats is alteration through trampling of vegetation, introduction of invasive species, and any impacts associated with infrastructure development. Effects to non-hunted wildlife species would primarily be the result of disturbance related to hunters traveling to and from hunt blinds in the waterfowl hunting unit, elk hunters in pursuit of elk and during the course of hunting.

1.6.1.4 IMPACTS ON FEDERALLY LISTED THREATENED SPECIES

Water howellia, *Howellia aquatilis*, a federally-listed threatened plant species, is a wetland obligate with several occurrences on the Refuge. Potential impacts are associated with hunters walking through howellia wetlands that are dry during the fall and trampling newly germinated seedlings.

Spalding's silene, *Silene spaldingii*, a federally-listed threatened plant species is found in the steppe habitats of the Palouse Region. Most of the potential habitat on the Refuge has been searched with 6 populations located. Potential impacts are associated with destruction of habitat through infrastructure development, introduction of competitive invasive species and trampling by individuals traveling in steppe habitat on foot.

The status of these species on the Refuge (Section 3) and the effects of the alternatives (Section 4) are discussed under their respective habitats; water howellia - wetlands and Spalding's silene – steppe.

1.6.2 SOCIAL AND ECONOMIC ISSUES

1.6.2.1 CULTURAL RESOURCES

Cultural resources on the Refuge take the form of archaeological artifacts associated with seasonal Native American encampments and food processing sites, historic homesteads and dump sites, and examples of historic construction and agriculture techniques such as drainage ditches or water control structures. Actions associated with implementing a hunt that may adversely affect these resources unless mitigated include construction of facilities such as parking areas, accessible trails and waterfowl hunting blinds, and vandalism or theft associated with increased visitation in the hunting units. Soil disturbing activities associated with use of heavy equipment during the construction of parking areas, trails and blinds can destroy artifacts or change their relative position destroying information on their historic context. Cultural resource protection is required on all refuges. Project proposals must be reviewed for compliance. Protection involves survey of the project areas, avoidance of cultural sites or mitigation. Mitigation can involve more detailed survey and study of resources prior to implementing actions that will impact them. The risk of theft and vandalism may increase through the course of the hunting season as more areas of the Refuge are open to visitors.

1.6.2.2 IMPACTS ON ADJACENT LANDS

Depredation by elk on agricultural crops such as hay and winter wheat is the primary issue concerning impacts on private lands. Hunting activities on the Refuge could potentially increase these impacts if elk, as result of increasing disturbance, rely less on Refuge as security cover and expand their range during the hunting season.

1.6.2.3 RECREATION

The primary issues concerning other non-hunting recreational pursuits on the Refuge are the effects the alternative elk and waterfowl hunting programs would have on the quality of the

experience of the participants. The indicators used in the CCP to look at effects of the proposed action on the key issue of recreation were based on the opportunities for several classes of public uses including nature/wildlife observation and birdwatching, compatible non–motorized trail activities and longer trail loop options, increasing numbers of destination visitors, quality hunting, and a compatible and sustainable Environmental Education program both on and off Refuge.

Hunting could have an effect on these indicators by either decreasing or increasing the abundance of wildlife through disturbance by hunters causing a variety of animals to move away from the hunted zones, safety conflicts between hunters and non-hunters, or diminishing the aesthetic value of the experience by the occasional sound of shots and perhaps even the knowledge that hunters are on the Refuge as evidenced by parked vehicles at gates, hunters in blazed orange with fire arms walking in areas closed to the general public, and the sight of hunters transporting their harvested animals.

1.6.3.4 ECONOMICS

The economic issues associated with hunting on Turnbull NWR are associated with the contributions that hunters would make to the local and regional economies as a result of expenditures for both activity-related equipment purchases and travel-related goods and services.

2.0 ALTERNATIVES INCLUDING THE PREFERRED ALTERNATIVE

2.1 INTRODUCTION

This section outlines 2 alternatives for initiating an elk hunt and youth waterfowl hunt on the Refuge to provide a compatible recreational hunting opportunity to the public not previously available and to reduce impact to aspen from an elk herd that uses the Refuge's closed area disproportionately to other parts of their range on the Refuge. The elk population has the potential to increase either through immigration or by reproduction. The herd is unlikely to decrease through emigration since elk experience increasing disturbance from human activities on private land surrounding the Refuge especially hunting. Elk that use the relatively disturbance free portions of the Refuge rarely leave it during the hunting season. The alternatives discussed below are based on management goals and objectives as stated in the Turnbull National Wildlife Refuge CCP (USFWS 2008) and the Draft Hunt Plan (Appendix B).

2.2 ALTERNATIVES

2.2.1 ALTERNATIVE A

All actions proposed under the preferred alternative in the CCP are to be implemented including a 2-day youth waterfowl hunt and a limited–entry permit only elk hunt. The youth waterfowl hunt would occur on the same weekend offered by the State. The hunt would take place on the northern shore of Upper Turnbull Slough. This unit is approximately 140 acres in size. Hunters will be required to hunt within 50 yards of 6 marked locations that are approximately 300 yards apart (Figure 2.1). One of the hunt blinds will be accessible to disabled hunters. Access to the blinds will be from the road that parallels the north side of Upper Turnbull inside Gate 6 on the Cheney Plaza Road.

The Rocky Mountain Elk hunt proposed in this alternative would include hunting within the three units specified in the CCP (Figure 2.2). The hunt seasons will be for the most part concurrent with the seasons offered by the state in Game Management Unit (GMU) 130. The seasons and permits offered in each unit are detailed in Table 2.1. Hunters will be required to obtain an elk tag for the Refuge Hunt of their choosing through application with the state who will assign tags by lottery. In addition, hunters will be required to purchase a Refuge Access Pass at a cost of $25. Hunters, with the exception of disabled hunters, will only be allowed access by foot through the following gates where parking will be provided 9, 7, 12, 18, and 1B.

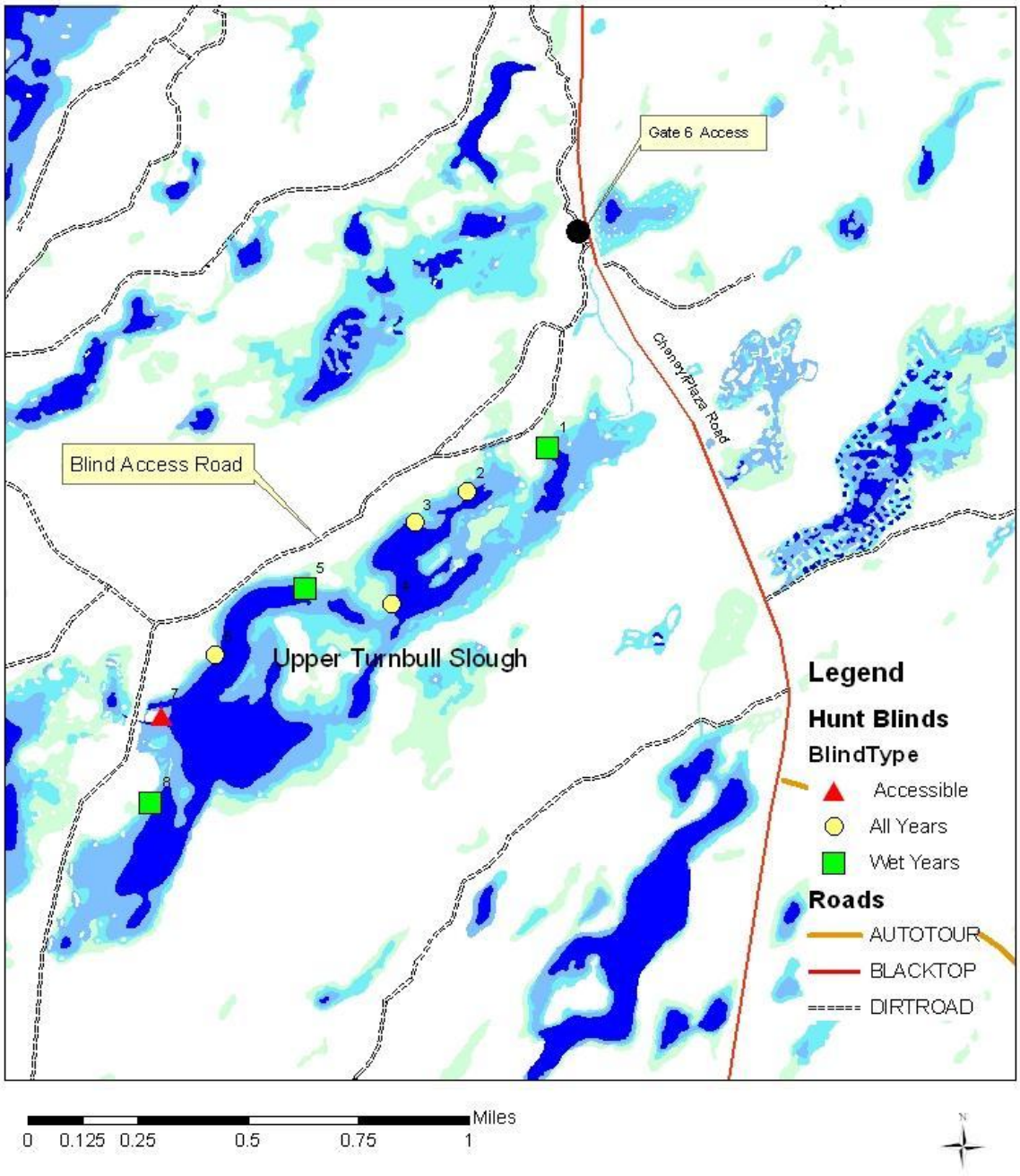

Figure 2.1 Turnbull NWR proposed waterfowl hunt blind locations and access point and road.

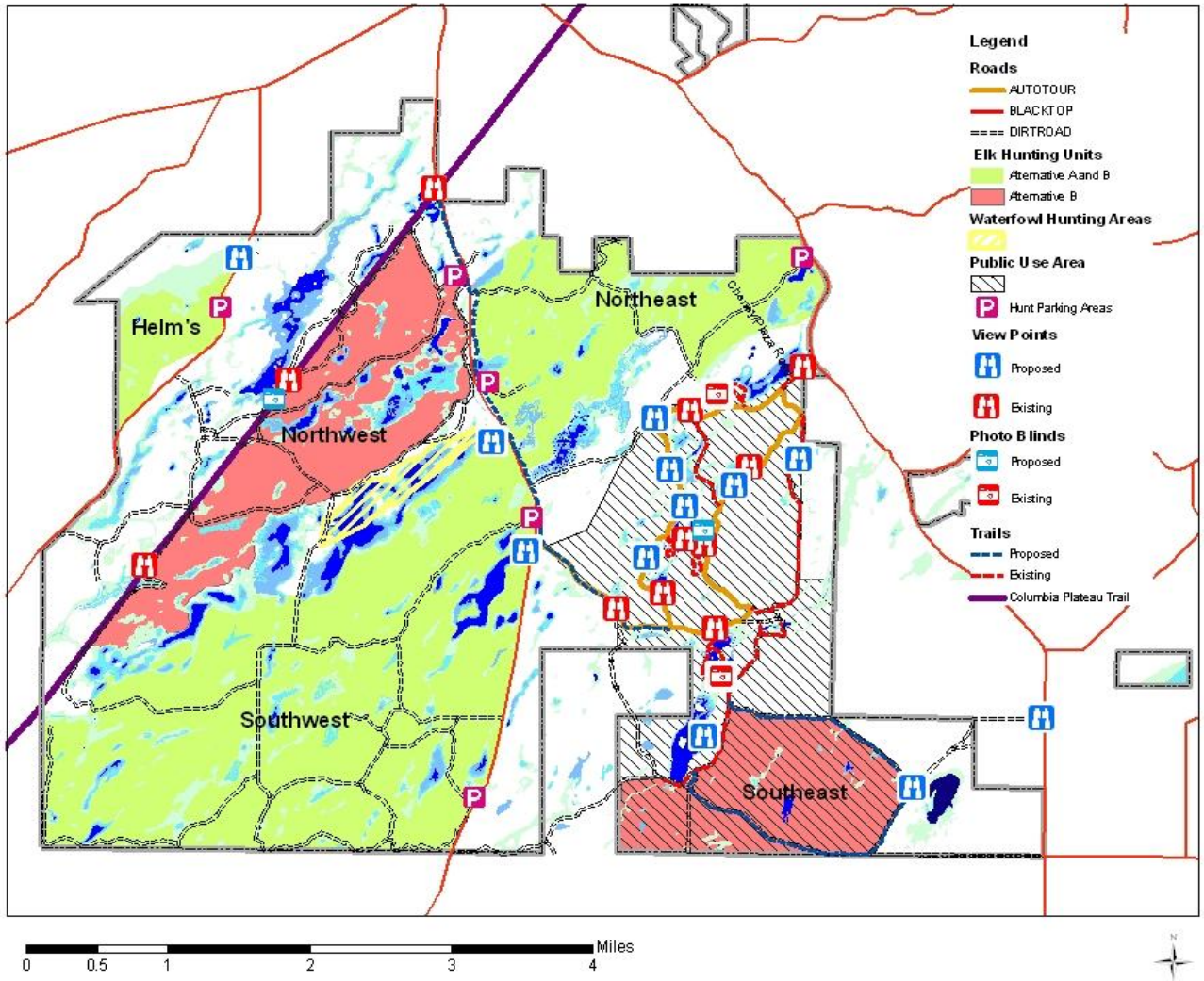

Figure 2.2 Hunt areas of Alternative A and B in relation to other public use facilities

2.2.3 ALTERNATIVE B

This alternative includes implementation of the 2-day youth waterfowl hunt described under Alternative A. The elk hunt would include 2 units in addition to those included in Alternative A. Because these 2 units are near areas used by the non-hunting public, they will only be open during the early and late archery and muzzleloader seasons (Table 2.1). The 2 additional units would be opened to hunting if monitoring indicates that elk are utilizing the remaining refuge no-shooting zones disproportionately to the hunt units increasing impacts to aspen in these areas and reducing harvest opportunities both on and off-refuge. An additional Parking Area will be required at Gate 5 for access to the Northwest Unit (Figure 2.2).

Table 2.1. Turnbull NWR Proposed Seasons and Number of Permits per Season

Hunt Season	Alternative A			Alternative B				
	SW	NE	Helms	SW	NE	Helms	NW	SE
Early Archery Sept 8-21	8	4	2	8	4	2	3	2
Disabled Sept 22- Oct 3	6	0	0	6	0	0	0	0
Early Muzzleloader Oct 4-10	6	2	1	8	2	1	3	2
Modern Firearm Oct 25- Nov 2	6	0	0	6	0	0	0	0
Late Archery Nov 4-16	8	4	2	8	4	2	3	2
Late Muzzleloader Nov 20- Dec 8	6	2	1	8	2	1	3	2
Advanced Hunter Dec 9-31	6	2	1	6	2	1	3	2
Totals	46	14	7	50	14	7	15	10

3.0 AFFECTED ENVIRONMENT

3.1 GENERAL OVERVIEW OF THE REFUGE ENVIRONMENT

An extensive description of the entire Refuge environment and surrounding lands was provided in the Refuge's Comprehensive Conservation Plan. In this EA, a brief summary is provided with more detail given on aspects of the environment that are potentially impacted by the proposed alternatives. Principally this will include habitats and associated wildlife that are present in areas potentially frequented by hunters pursuing waterfowl and elk during the seasons offered in the alternatives. Turnbull National Wildlife Refuge is located on the eastern edge of the Columbia Basin in Spokane County in northeastern Washington (Figure 3.1). Cheney, the nearest town, with a population of 10,000 is located only two miles north of the Refuge. Spokane, a major metropolitan area of nearly 500,000 people, is 25 miles northeast of the Refuge. Spokane County is growing at a rate of 10% per year and becoming increasingly urbanized.

The climate is semi-arid with an average annual precipitation of 16.5 inches. The majority of precipitation falls as snow from November to February with a yearly average of 50 inches. Above average snow-years occur 3 out of every ten years. Drought periods are common. Summers are warm and dry with average daily highs above 80 degrees F. Winter months are cool with mean daily temperatures between 25 and 30 degrees F.

Located on the eastern edge of the Columbia Basin, the Refuge is situated in an area referred to as the 'Channeled Scablands'. The Scablands were formed approximately 15,000 years ago when several ice age floods scoured away the loess soils of the Palouse in large tracts exposing the underlying basalt. Numerous channels and depressions were eroded in the basalt. These channels and depressions later became a diverse complex of lakes, sloughs and ponds. Around many of these wetlands developed aspen, water birch, alder and hawthorne riparian communities. The upland areas with its mixture of exposed rock, soil mounds and depressions containing deeper soils now support a mosaic of steppe and forested plant associations. The shallow rocky soils of the flood channels provided an avenue for a narrow extension of the ponderosa pine zone of the north into the steppe habitats of the Columbia Basin. The 7,000 acres of refuge pine forest represents a significant percentage of the ponderosa pine zone in the state of Washington that is managed strictly for bio-diversity. The small portion of meadow steppe habitat (1000 acres) on the Refuge represents half of the remaining intact and protected Palouse prairie in the state. The 3200 acres of wetlands represents one of last remaining complex of scabland wetlands. On most of the private lands surrounding the Refuge all but the small pothole wetlands have been drained and converted to hay and pastures.

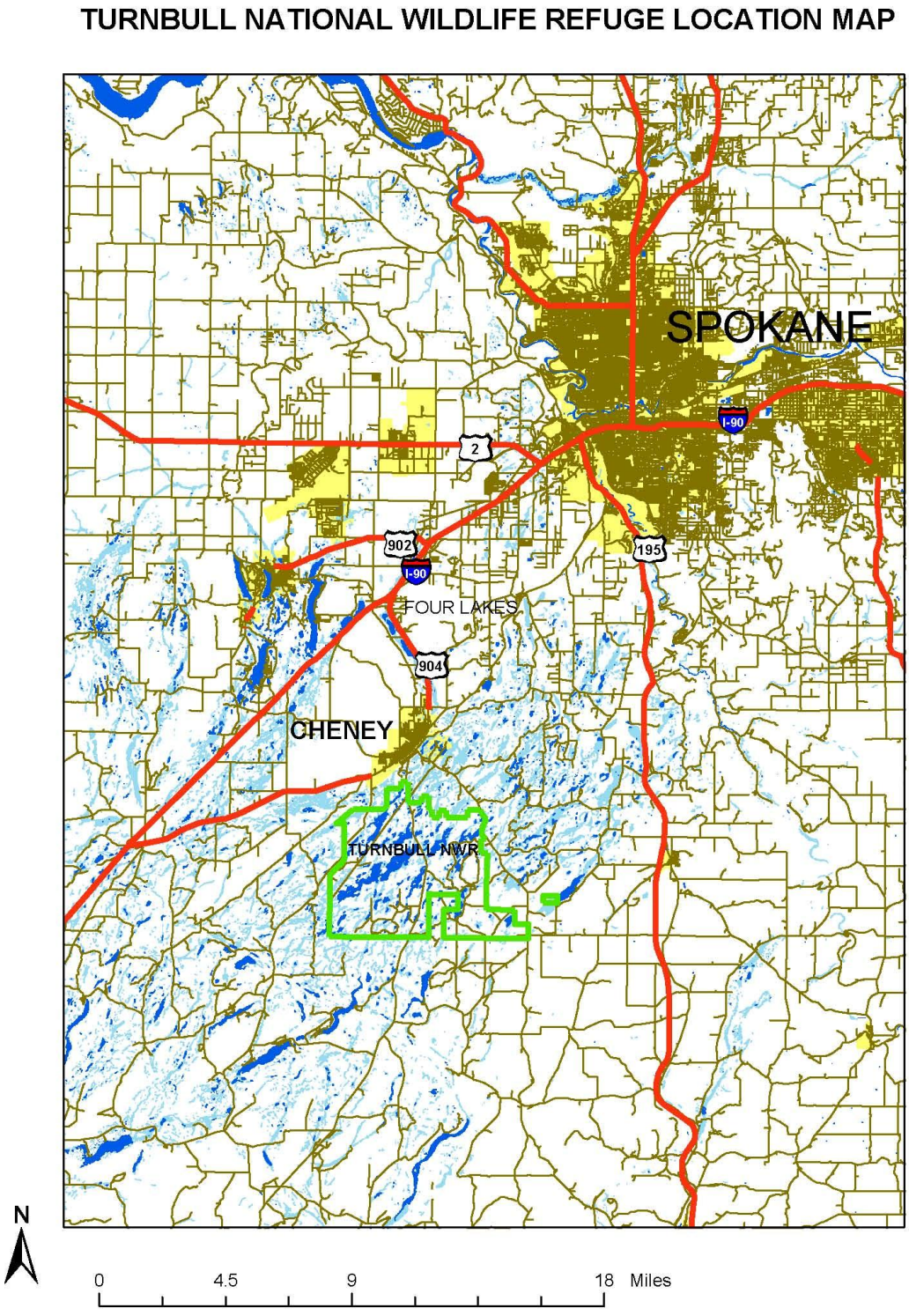

Figure 3.1 Vicinity Map

3.2 BIOLOGICAL ENVIRONMENT

3.2.1 ROCKY MOUNTAIN ELK

Although archaeological evidence suggest that elk may have once been fairly widespread in eastern Washington and were hunted by native Americans residing in the area, the earliest written records of Rocky Mountain elk in eastern Washington exist from the late 1800's for only the Okanogan, Blue Mountains, and Yakima areas. Elk, if historically present in the Refuge area and the forested portions of northeastern Washington, appear to have been eliminated by the time of settlement. Reintroductions in the early 1900's, however, resulted in expanding herds throughout much of the forested portions of eastern Washington. From these reintroductions and subsequent transplants, elk populations increased dramatically in the 40's, 50's and 60's. Rocky Mountain elk were first observed on the Refuge in the late 1950's. Although increasing numbers were observed on the Refuge and in most of southern Spokane County since their first appearance, dramatic increases did not occur until the early 1980's. By the late 1980's, the elk population in the Refuge vicinity was estimated at between 60 to 80 animals, based primarily on incidental observations. As the elk population grew in size so did interest in its management. In 1993, the elk of southern Spokane County were designated the Hangman Creek sub-herd by the Washington Department of Fish and Wildlife (WDFW) and managed as part of the Selkirk Herd of northeastern Washington.

The first aerial survey of this elk population was completed during the spring of 1993. The estimated population size was between 271 and 384 (95 percent confidence interval) with 60 elk observed on the Refuge. Additional aerial surveys were conducted in 1994 and 1995. These surveys indicated a growing population with high productivity. During an aerial survey conducted by the State in 1997 (Meyers 1997), 93 elk were observed on the Refuge and the estimated population for the sub-herd was between 115 and 219 animals (95 percent confidence interval). This population decrease for the entire sub-herd is likely the result of the any-bull strategy and offering either-sex and antlerless hunts with extended seasons for muzzle loaders and Advanced Hunter Education graduates. Since 2004, aerial surveys have been conducted annually with the exception of 2005. Although few data points are available for both the Refuge and its vicinity prior to 2004, it appears that the intensive hunting pressure around the Refuge starting in 1997 initially reduced elk populations in the area, but increased use of the Refuge as a security zone. The sanctuary of the Refuge has resulted in a rebound in the population that now appears to have stabilized at between 300-400 animals (Figure 3.2).

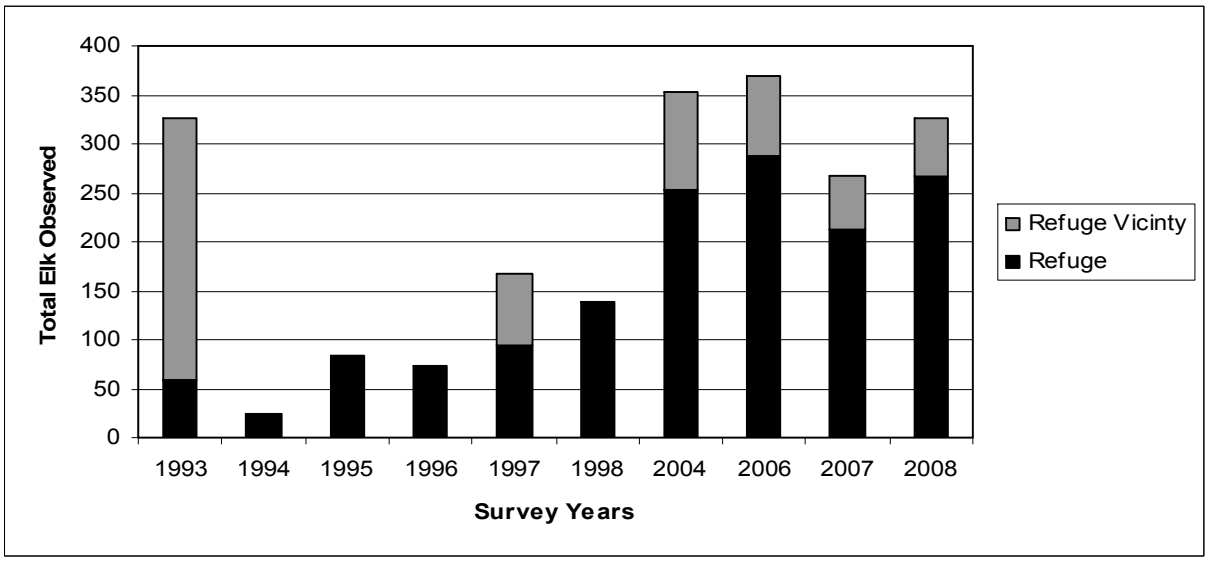

Figure 3.2. Fall Survey results for Refuge and adjacent survey quadrants within 3 miles of Refuge (Ferguson 2008a).

The annual productivity of this herd has been increasing over the past several years from 50 calves per 100 cows in 2004 to 83 calves per 100 cows in 2008 (Table 3.1).

Table 3.1 Composition counts and bull: cow: calf ratios from aerial surveys at and around Turnbull NWR (Ferguson 2008b).

				Ratio: 100 Cows		
Year	Bulls	Cows	Calves	Bulls:	Cows	:Calves
2004	36	211	106	17	100	50
2006	49	207	113	24	100	55
2007	50	140	78	36	100	56
2008	61	145	121	42	100	83
MEAN	49	175.75	104.5	29.75	100	61

Annual harvest of elk in the refuge vicinity has been increasing in recent years from a yearly average of 64 animals from 2001 to 2004 to harvest of over 100 animals in the past 3 years (Table 3.2). Harvest is dependent on the number and skill of hunters in the field, the length of season, type of weapon, and the sex of animal hunted. Although hunter numbers and the days hunting have not changed significantly during the past 5 years, hunter success has increased substantially. This is particularly true for modern firearm hunters (Table 3.3).

The relatively stable population level observed in recent years is likely the result of this increase in harvest that has removed near the equivalent of the mean annual production of calves (estimated at 100).

Table 3.2. Elk harvest data for all weapons combined in GMU 130-Cheney

Year	Antlered	Antlerless	Total	Hunters	Success	Hunter Days	Hunter Days/Elk
1999	57	42	99	866	0.11	6933	70.0
2000	50	86	136	1138	0.12	5138	37.8
2001	35	33	68	640	0.11	3324	48.9
2002	27	30	57	632	0.09	3371	59.1
2003	37	37	74	546	0.14	2945	39.8
2004	33	24	57	623	0.09	2994	52.5
2005	56	63	119	542	0.22	2567	21.6
2006	55	61	116	575	0.20	2934	25.3
2007	60	44	104	558	0.19	2961	28.5
Mean	45.6	46.7	92.2	680.0	0.14	3685.2	42.6

Because this elk population is well established, three primary issues concerning this population have developed, including impacts to aspen dominated habitats, damage to private lands, and recreational hunting opportunities. Although aspen habitats occur in small amounts relative to other habitats on the Refuge, they are particularly important to a large portion of the wildlife on the Refuge. Elk use and preference for aspen and other deciduous browse is well documented. Under high populations and limited habitat, elk browsing can have a significant negative impact on the regeneration of aspen. In areas of suburban development or intense hunting pressure, elk use of such places like Turnbull NWR - that provide both security cover and forage - increases.

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Research has been conducted by the State and Eastern Washington University to determine the extent that the Refuge acts as a security zone for this sub-herd. Results indicate that radio-collared elk are utilizing the Refuge disproportionately to other areas. Over 90 percent of the relocations made during the day in 2001 and 2002 were recorded on the Refuge (Albrecht 2003). During the hunting season radio-collared elk seldom left the Refuge during daylight hours. This high elk use has resulted in heavy browsing of young aspen and other deciduous shrubs and trees on the Refuge, especially in recently burned areas. Work by Albrecht (2003) on 12 exclosures and adjacent unprotected plots found that in 2001 elk browsing had a significant impact on the height and growth form of aspen. The exclosures were revisited in 2006 and total population counts were made in the protected and unprotected plots (Rule 2007). The outcome of this study has shown that current elk use of Refuge aspen is having a significant negative impact on the structure and sustainability of this important habitat. Ungulate browsing on average is removing 75% of the annual height growth of aspen below 3 meter in height. In high elk use areas that have been burned,100% of the annual growth is being removed and regeneration is not reaching 3-meters in height, where it is safe from browsing. In low elk use areas, the amount of removal is less and is allowing height growth with recruitment of some aspen regeneration to the over 3 meter height classes. Only 25% of all the plots measured had enough older well–formed stems and enough aspen regeneration to meet minimum thresholds of viability. Most plots would be considered declining by published standards. Recruitment of more aspen regeneration is needed. Under current ungulate densities this will not occur except in rare cases in the low elk use areas.

Table 3.3. Elk harvest data for modern fire arm seasons in GMU 130-Cheney

Year	Antlered	Antlerless	Total	Hunters	Success	Hunter Days	Hunter Days/Elk
1999	47	25	72	420	0.17	3522	48.9
2000	9	31	40	478	0.08	1563	39.1
2001	19	15	34	250	0.14	1026	30.2
2002	18	12	30	243	0.12	949	31.6
2003	14	18	32	183	0.17	888	27.8
2004	14	10	24	227	0.11	881	36.7
2005	33	32	65	224	0.29	864	13.3
2006	21	30	51	218	0.23		0.0
2007	45	28	73	263	0.28	1229	16.8
Mean	24.4	22.3	46.8	278.4	0.18	1365.3	27.2

Table 3.4. Elk harvest data for muzzleloader seasons in GMU 130-Cheney

Year	Antlered	Antlerless	Total	Hunters	Success	Hunter Days	Hunter Days/Elk
1999	10	17	27	391	0.07	3241	120.0
2000	39	52	91	594	0.15	3266	35.9
2001	15	18	33	347	0.10	2034	61.6
2002	9	14	23	354	0.06	2202	95.7
2003	21	18	39	334	0.12	1906	48.9
2004	16	13	29	363	0.08	1968	67.9
2005	21	30	51	275	0.19	1519	29.8
2006	28	30	58	298	0.20	1646	28.4
2007	11	15	26	246	0.11	1484	57.1
Mean	18.9	23.0	41.9	355.8	0.12	2140.7	60.6

Table 3.5. Elk harvest data for archery seasons in GMU 130-Cheney

Year	Antlered	Antlerless	Total	Hunters	Success	Hunter Days	Hunter Days/Elk
1999	0	0	0	55	0.00	170	
2000	2	3	5	67	0.07	310	62.0
2001	1	0	1	43	0.02	264	264.0
2002	0	4	4	35	0.11	220	55.0
2003	2	1	3	29	0.10	151	50.3
2004	3	1	4	33	0.12	145	36.3
2005	2	1	3	43	0.07	184	61.3
2006	3	1	4	54	0.07	297	74.3
2007	3	1	4	46	0.09	233	58.3
Mean	1.8	1.3	3.1	45.0	0.07	219.3	82.7

Hunting and trapping were once popular activities in the area with settlers before the Refuge was established. In the 1930s when the Refuge was established the prevailing public view was that there should be no hunting at the Refuge. The original advocates for Refuge establishment included the Spokane Sportsman's Association, who wanted a sanctuary where hunting would not be permitted. They hoped to create a place where wildlife could flourish and act as a source for adjacent hunted lands. Hunting was not then and has never since been permitted at the Refuge. Some hunting advocates have expressed the desire to open the Refuge to elk hunting primarily to mitigate for some of the depredation that occurs occasionally on adjacent lands. The Washington Department of Fish and Wildlife has openly advocated an elk hunt on the Refuge over the past 10 years primarily to help alleviate problems with elk depredation on private lands around the Refuge. In the Washington State Selkirk Elk Herd Plan (Zender et. al. 2004), one of the objectives for the Hangman Creek PMU which includes the Refuge is to "stabilize elk numbers at levels tolerable with landowners and suburban expansion." One of the strategies proposed to achieve this objective besides extended seasons and liberal either-sex recreational hunts in the area is to "encourage the Turnbull National Wildlife Refuge to consider a limited entry season for antlerless elk to address the increasing number of elk using the Refuge during hunting seasons." Staff members from the State and the Refuge have met on several occasions during this time period to discuss the elk issue and options for population control. The Service position has been that a hunt on the Refuge could not be offered as an alternative without a better understanding of the ecology of this population and the impacts the herd is having on Refuge habitats. The State and the Refuge have cooperated on research to answer these questions. The State's desire for a Refuge hunt has not been as strong lately as a result of decreasing damage claims. Several landowners in the area have responded to elk damage by leasing their land for hunting to reduce damage and provide income.

3.2.2 WATERFOWL

Currently there is around 942 acres on average of fall wetlands that provide habitat (Figure 3.3) for approximately 800,000 waterfowl use days with peak populations of ducks of nearly 25,000 and daily averages of near 10,000 (Table 3.6). Habitat is available until late November when most wetlands freeze-up forcing birds in the area to either migrate south or move to deeper lakes and rivers in the area that may stay open through winter. At the current time, fall waterfowl habitat within the Refuge vicinity is very limited as a result of extensive drainage of the large, historically permanent wetland sloughs in the early 1900s. Over 70 percent of the wetlands in this area have been drained. The result is that there is only 1,200 additional acres of fall waterfowl habitat in the refuge vicinity which is estimated to support an additional 1,865,000 waterfowl use days (Table 3.6). As a result of the extensive drainage of fall migration habitat and extensive development of irrigation wasteways and agriculture in the central Columbia Basin, much of the fall waterfowl migration has shifted west of the Refuge. Increases in waterfowl use of the Refuge in the fall during above average precipitation years, however, indicate that restoration of fall migration habitat would likely increase waterfowl populations in this area.

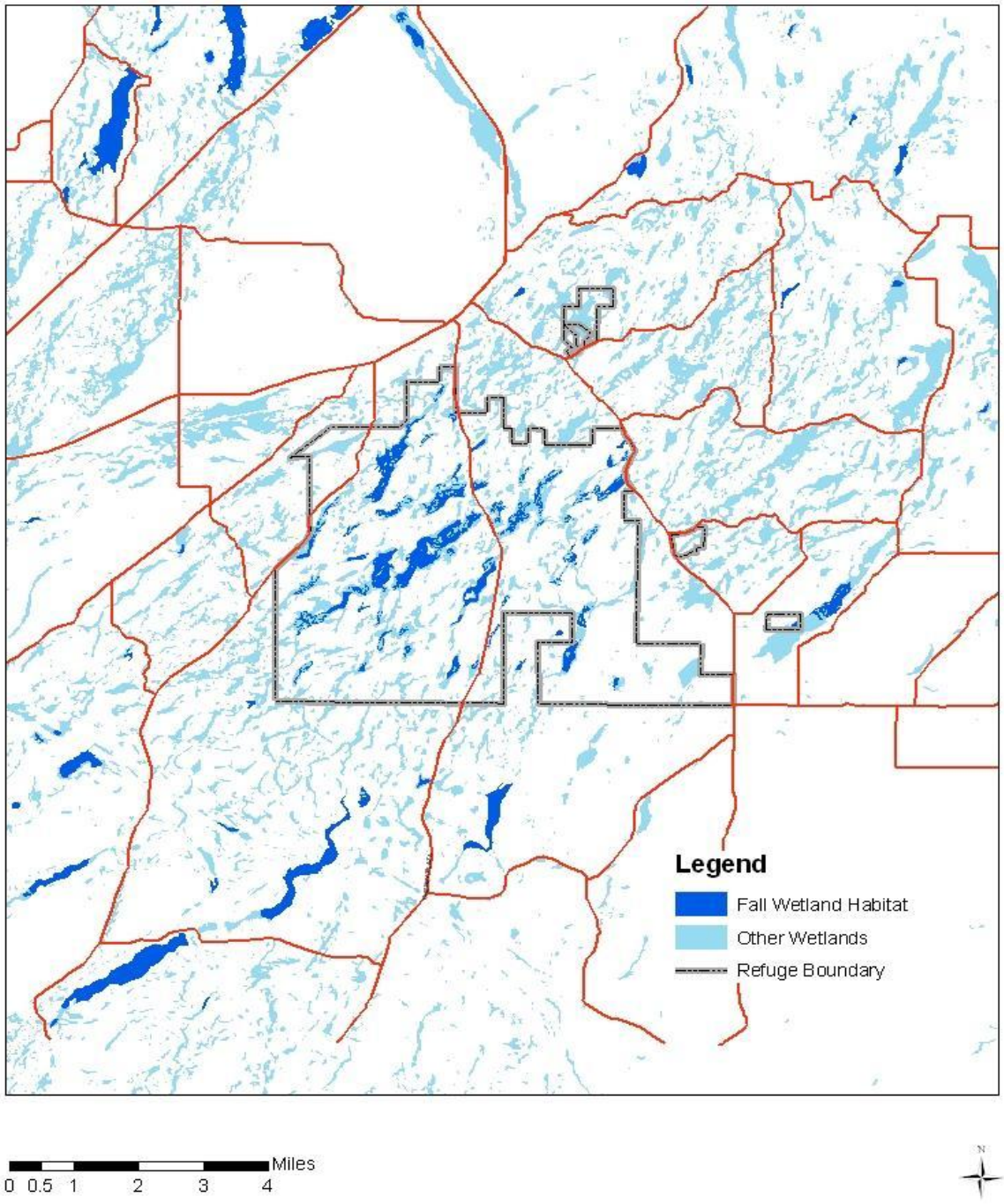

Figure 3.3. Fall wetland habitat available on the Refuge and the surrounding area.

Table 3.6. Estimated Daily Populations and Fall Use Days (September15 - November 30, 76 Days) for the proposed hunt unit, Refuge total and the Stewardship Area plus Refuge.

	Average Daily Fall Population			Waterfowl Use Days			
Species	Hunt Unit	Refuge	Stewardship Area	Hunt Unit - 2-days	Hunt Unit - Fall Total	Refuge Total	Stewardship Area
MALLARD	1246	7121	16472	2492	94709	541196	1251875
GADWALL	165	944	2184	330	12555	71744	165956
WIGEON	150	858	1985	300	11411	65208	150837
G.W. TEAL	44	254	588	89	3378	19304	44653
B.W. TEAL	62	356	823	125	4735	10680	24705
C. TEAL	33	191	442	67	2540	2865	6627
SHOVELER	9	54	124	19	712	4066	9405
PINTAIL	101	579	1339	203	7701	44004	101788
TOTAL DABBLERS	1812	10356	23956	3625	137741	759067	1755846
REDHEAD	9	54	125	19	722	4123	9537
CANVASBACK	11	62	143	22	825	4712	10900
L. SCAUP	36	208	481	73	2766	15808	36566
RING-NECK	24	138	319	48	1835	10488	24260
BUFFLEHEAD	7	39	90	14	519	2964	6856
RUDDY DUCK	22	124	287	43	1649	9424	21799
TOTAL DIVERS	109	625	1446	219	8316	47519	109919
TOTAL DUCKS	1922	10982	25403	3844	146057	806586	1865765

3.2.3 WETLANDS AND ASSOCIATED SPECIES

3.2.3.1 HABITAT

Approximately 3,900 acres of wetland habitat are located in the Refuge. The nearly 200 bodies of water range in size from tiny vernal pools to large permanent wetlands over 400 acres in size. There is a great diversity of plant species found in refuge wetlands. These plants occur in different vegetation zones that are dictated by water depth and the length of time a portion of a wetland basin is flooded. The four major wetland zones are wet meadow, seasonal shallow marsh, semi-permanent emergent marsh, and permanent open water. In most years only the lower one-third of the semi-permanent marshes and the permanent open water areas still hold water for wetland dependent species in the fall.

The small, semi- permanent wetlands of the Refuge also support the threatened plant species, water howellia (Howellia aquatilis) (Figure 3.4). The Refuge and vicinity support one of the largest known metapopulations of this species within its range (Shelly and Gamon 1996).

3.2.3.2 Non-waterfowl Wetland Wildlife

The fall concentrations of waterfowl on the remaining flooded habitat previously described also attract bald eagles in moderate numbers. These same wetlands currently provide important post-breeding foraging habitat for pied-billed grebes, great blue herons, American coots, sora, Virginia rails, American bittern, and red-winged and yellow-headed black birds. Reptiles and amphibians such as the western –painted turtle, Columbia spotted frog, and blotched tiger salamander utilize these wetlands as critical overwintering habitat. Resident mammals that are also found in these wetlands year round include moose, beaver, muskrats and river otters.

As these same wetlands naturally drawdown in late summer they also provide important shallow foraging habitat along their shorelines for up to 25 species of migrating shorebirds such as the western, least and Baird's sandpiper, greater and lesser yellow-legs, and long-billed dowitchers. The fall shorebird migration usually extends into the two weeks of October.

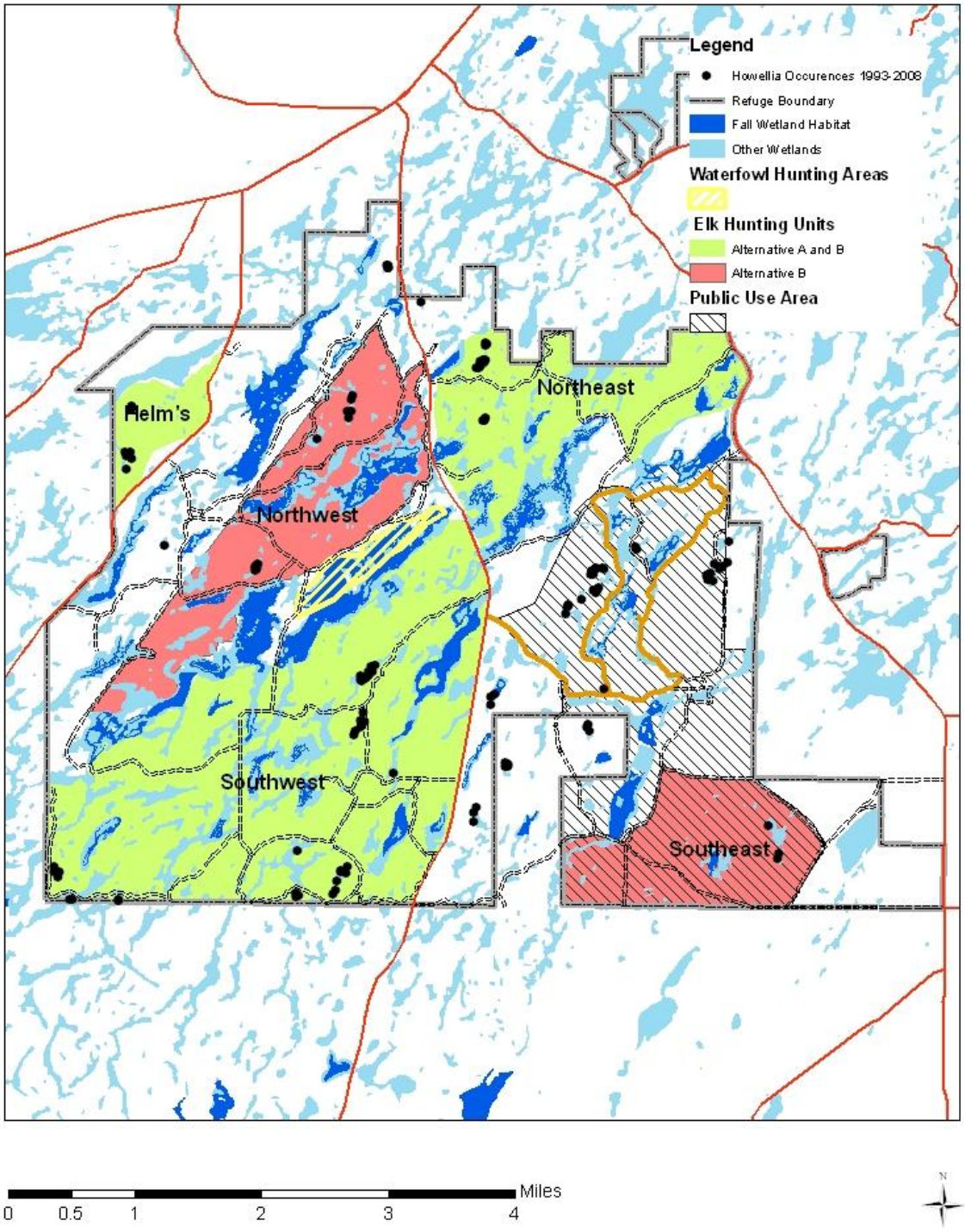

Figure 3.4 Known water howellia occurrences on Turnbull NWR in relation to hunt units and The Public Use Area.

3.2.4 STEPPE HABITAT AND ASSOCIATED SPECIES

3.2.4.1 Habitat

Approximately 6,000 acres of open steppe occur within the Refuge. The open steppe habitats of the Refuge fall into a broad category of plant associations referred to as Palouse steppe (also known as 'meadow steppe') (Daubenmire 1970). Palouse steppe plant associations form a chain around the north and eastern periphery of the Columbia Basin Ecoregion between areas of extensive forests and the drier shrub-steppe areas of the lower Columbia Basin. These plant associations occur on two distinct landforms, the rolling Palouse Prairie hills and the unique "biscuit and swale" patterned ground of the Channeled Scablands. The Idaho fescue/common snowberry (*Festuca idahoensis* and *Symphoricarpos albus* respectively) association is common to both landforms, and together with other plant associations found in the grasslands, can support a diverse community of native plant species including some that are endemic to the northern Columbia Basin. One of these species, Spalding's silene, is a federally listed threatened species. Several populations have been located on the Refuge and the surrounding area on remnants of high quality steppe (Figure 3.5).

Nearly 90 percent of the original Palouse Prairie steppe habitat has been converted to dryland farming (Cassidy et.al. 1997). The extent of this loss places this ecosystem on the list of critically endangered ecosystems in the United States (Noss et. al. 1995). Most of the remnant Palouse Steppe is found in small fragments on north slopes too steep for plowing or within the "biscuit and swale" land form of the Channeled Scablands.

3.2.4.2 Steppe Wildlife Species

The Palouse steppe habitat has the potential to support substantial populations of several ground nesting passerines including the western meadowlark, grasshopper, savannah and vesper sparrows. Many of these species are experiencing declining population trends regionally and have been identified as species of concern. Most of these species are present on the Refuge through September. Some additional species that move through the area during the fall are mountain bluebirds, common redpoll, white-crowned sparrow and northern shrikes.

These habitats also support large, small mammal populations including the Columbia ground squirrel, Great Basin pocket mouse, vagrant shrew and northern pocket mouse. This abundant prey base supports a diverse community of predators consisting of several raptor species (red-tailed hawks, rough-legged hawks, American kestrels, northern harriers), coyotes, and badgers.

3.2.3 PONDEROSA PINE HABITAT AND ASSOCIATED SPECIES

3.2.3.1 Habitat

The abundance of wetlands and the shallow water table of the flood channels provide an avenue for a narrow extension of the Ponderosa Pine Zone from the northeast into the more arid steppe

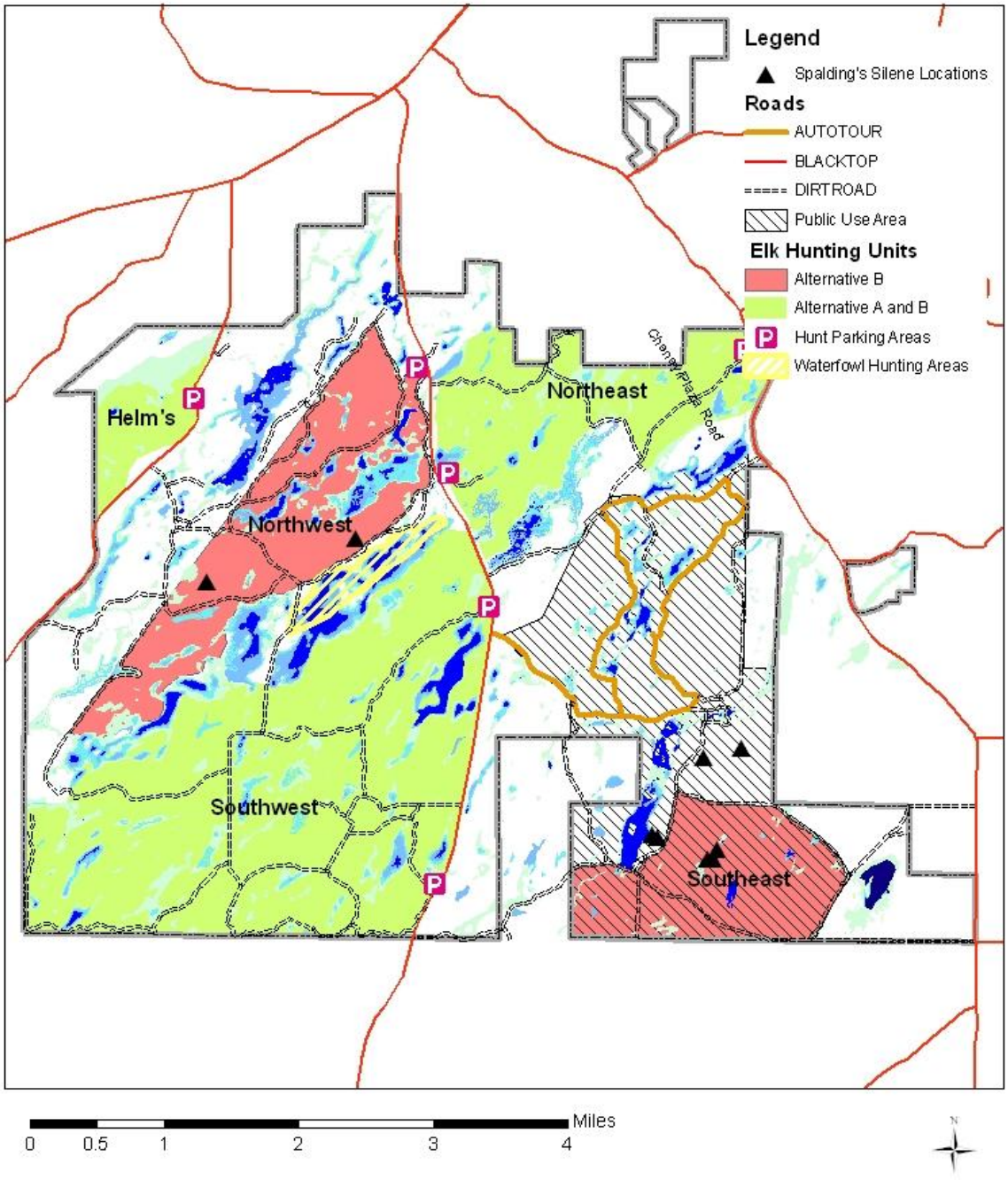

Figure 3.5. Known occurrences of Spalding's silene in relation to proposed hunting units and the Public Use Area.

habitats of the Columbia Basin. The Refuge is situated within this peninsula of forest that is less than 6-miles wide. Approximately 6,500 acres of ponderosa pine forests occur within the Refuge.

The two pine associations found in the Refuge are ponderosa pine (Pinus ponderosa) /Idaho fescue and ponderosa pine/snowberry (Daubenmire 1952 and Franklin and Dyrness 1973). The distribution of these associations is influenced primarily by soil moisture regime. The ponderosa pine/fescue occurs on drier sites with shallow rocky soils. These stands are often found on flat to gently sloping terrain and the low ridges between wetland drainages. The ponderosa pine/snowberry association is found mostly in shallow depressions, at the bottom of slopes near wetlands, and on the north aspects of basalt bluffs. Soils are deeper, less well drained and consist primarily of silt loams of the Hesseltine complex.

3.2.3.2 Ponderosa Pine Wildlife Species

There are twenty eight species of wildlife that utilize the ponderosa pine forest of the Refuge and its vicinity as breeding and foraging habitat. Although most of the ponderosa pine forest stands around the Refuge have been heavily logged and now consist of dense unhealthy stands of small diameter trees, habitat exists for several tree canopy nesting birds such as the chipping sparrow and cavity using wildlife species, including several bat species of concern. In the fall and winter the ponderosa pine stands provide important foraging habitat for both migrant and resident bird species including black-capped and mountain chickadees, red crossbills, pygmy nuthatches, hairy woodpeckers and red-shafted flickers. The potential exists to restore these forest stands to more natural stand conditions supporting large diameter trees and snags that will provide improved habitat for such species as the western bluebird and the Lewis' woodpecker, a state candidate species.

3.2.4 RIPARIAN HABITAT AND ASSOCIATED SPECEIS

3.2.4.1 Habitat

Approximately 219 acres of aspen forests occur within the Refuge. Aspen communities, including water birch, alder, and hawthorn, occur mostly as narrow bands along the edge of meadows and large sloughs, and around the margins of pothole wetlands. Aspen dominated stands are a critical resource for wildlife species requiring both cavities and deciduous foliage in tree and shrub canopies for breeding and foraging.

This habitat has been significantly reduced in the Refuge vicinity by competition from encroaching ponderosa pine and the suppression of aspen and shrub regeneration by grazing livestock. In recent years, a growing Rocky Mountain elk population has been contributing to this problem. Many of the existing stands are dominated by over mature trees with little regeneration. In the past, periodic fire removed encroaching pines and encouraged regeneration of aspen and understory shrubs.

3.2.3.2 Riparian Wildlife Species

Aspen and riparian habitats support the highest diversity of wildlife species of all habitats within the Refuge. Sixty-five of the 124 species of breeding birds in this area frequent the aspen and deciduous shrub riparian plant communities for either reproduction or foraging. The aspen community type is the primary foraging and breeding habitat for ten of these species, including the willow flycatcher, yellow warbler and red-naped sapsucker (all neotropical migrants). The substantial insect populations associated with the high structural diversity and vegetation density in these habitats also makes them a focal point for many insectivorous species such as bats and neotropical migratory landbirds. Several species of bats, including the big brown bat, hoary bat, and silver-haired bat, utilize either aspen foliage or cavities in aspen trees and snags for roost. The dense cover of aspen/riparian habitats also provides critical fawn rearing habitat for white-tailed deer and important winter browse for Rocky mountain elk and white-tailed deer.

3.3 SOCIAL AND ECONOMIC ENVIRONMENT

3.3.1 CULTURAL RESOURCES

Turnbull NWR has some truly unique, interesting prehistoric and historic properties. Refuge surveys have resulted in several recorded prehistoric sites. There are three rockshelters, naturally formed by flood-eroded basalt faces, on the Refuge. These are large enough to provide human shelter but their most important use was probably food storage. At least nine rock pits in four different locations have been found on the Refuge. These pits probably held caches of either dried meat or plant foods, particularly roots. This storage method reduced the quantity of food lost to burrowing animals and the air circulation within the rocks helped reduce spoilage. Caches of this type were intended to blend into the surrounding rock to prevent raiding by other families or groups. Foods were commonly stored near collection areas and extracted in late winter/early spring when food supplies were low. These storage pits were probably used within the last 200 years since these types of structures are destroyed over time due to rock creep/movement (Holstine et al. 1992). Evidence of a roasting oven probably used for camas and dating back as much as 1,000 years has been found on the Refuge (Lyons 1993). Small lithic debris scatters that are estimated to be between 2,000 and 3,000 years old have been found. These are presumed to have been in locations of temporary food gathering camps. These sites, combined with information collected in other areas of eastern Washington, support the theory that during prehistoric times Refuge lands were used primarily on a seasonal basis for hunting and gathering (Holstine et al. 1992).

There are many historic sites on the Refuge including 38 farmsteads which have been recorded and several others known but not located. House foundations, fence jacks, and domestic detritus from the first quarter of the twentieth century including milk and tobacco cans, glass bottles, canning jars, and various metal objects remain to tell their story. More of these types of physical remains of historic sites are likely to be discovered throughout the Refuge.

3.3.2 ADJACENT LANDS

Although the Refuge is receiving the greatest proportion of use by elk in the Hangman sub-herd especially during the hunting season, elk do leave the Refuge during the night and following the

hunting season to forage on hay that has been bailed and stacked for winter feeding operations. The extent that this occurs depends a great deal on the quantity of snow. In years where snowfall covers much of the grass, elk frequent hay stack yards on a regular basis. During more open winters elk tend to stay on the Refuge, only leaving after the hunting season in January. At this time elk have been located to the south of the Refuge where they graze on winter wheat.

The Washington Department of Fish and Wildlife has received numerous complaints of elk damage to hay, other crops, fences, and ornamental shrubs within the Hangman Creek sub-herd's range since the early 1990's. Since 1992, two claims have been paid by the State for elk damage to agricultural crops. Claims have declined since 1999 as a result of several landowners in the area leasing their lands for hunting (Zender et. al. 2004).

3.3.3 RECREATION

All recreational activities on the Refuge are currently restricted to a public use area and the Columbia Plateau Trail. Visitors coming to the Refuge utilize the Public Use Area, drive or ride bikes on the auto tour route, and hike trails to observe and photograph the variety of wildlife inhabiting this relatively undisturbed area of the Channeled Scablands. Often visitors use their cars as blinds. Notably, the Refuge is identified in Washington's Watchable Wildlife Viewing Guide. Interpretive trails are generally short trails designed especially for the educational benefit of the casual or new Refuge visitor.

An important component of recreation on the Refuge is the extensive Environmental Education (EE) program. Although the Refuge has had some form of EE for most of its existence, the program has greatly expanded in the past ten years. Currently 3,500 to 9,500 students participate annually in Turnbull's EE and outreach programs (dependent on grants, donations, and annual discretionary funding). The highest use period for EE on the Refuge is late March to mid-June. Over 85 school groups (K-12) from Spokane County and surrounding areas have participated in the Program. Moreover, numerous civic groups, from preschool children to senior citizens, are provided field trips, night hikes, tours, in classroom activities, and guided nature walks on the Refuge throughout the year. An EE classroom with capacity for 50 students and four designated outdoor study sites on the Refuge are the key facilities used and maintained for the EE Program. Each study site is designed to provide nature walks, studies in aquatic ecology, and a seating area for instruction and activities. The outdoor classrooms are used on a rotational basis to minimize disturbance.

Some of the concerns that were voiced during our scoping and other public involvement venues during the development of the CCP revolved around the impacts that hunting may have on the non-hunting visitor. These concerns included impacts of loud gun shots on enjoyment of the Refuge and the sense that the Refuge would no longer be a safe place to hike and enjoy wildlife.

3.3.4 ECONOMICS

The Refuge is located in Spokane County south of the town of Cheney. The county population increased from 440,400 in 2005 to 451,200 in 2007, representing a 1.7 percent annual growth rate (Tweedy 2008). In 2006 per capita income was $30,266 (Tweedy 2008). The county is a regional economic center for eastern Washington and northern Idaho communities.

In 2006, the Fish and Wildlife Service evaluated the economic effects of Turnbull visitation on the regional economy (USFWS, 2007). The report, titled *Banking on Nature 2006: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation,* was compiled by Service economists. In 2006 more than 66,000 people visited Turnbull to hike the nature trails and drive the auto tour to observe birds and other wildlife. The study looked at money spent on food, lodging, and transportation as well as contribution to the local economy from Refuge employment. The Refuge was responsible for the creation of 18 private sector jobs, generating about $500,000 in job income and total tax revenue of $168,700. For every dollar in refuge budget expenditures, the Refuge returned $1.15 to the community.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter analyzes and compares the effects anticipated under each alternative. Effects are considered in four main topic areas: species and habitats, social, economic, and cultural. Within each topic area we have chosen the key indicators of concern for evaluation. These indicators highlight the key resource values under the topic of consideration. Each indicator is assessed for the effects that would occur to it by implementation of the hunting programs proposed under the different alternatives. Impacts to species and habitats are directly related to the density of hunters on a given day and the number of days an area is open to public access for hunting. The presence of hunters in a unit of the Refuge is best described as the number of hunter days which is the number of hunters multiplied by the number of days a unit is open to hunting. To better define the potential for impact, division of the total number of hunter days by the area of the hunt unit provides a reasonable indicator of the intensity of hunter impacts (hunter days per unit of area). Assuming that hunter distribution is reasonably uniform one can multiply the area of a given habitat such as wetlands in a hunt unit to get an idea of the number of hunter days within a habitat during the course of the hunt season. These values will be used repeatedly in the assessment of the effects of the alternatives.

4.2 EFFECTS OF ALTERNATIVES

4.2.1 BIOLOGICAL ISSUES

4.2.1.1 ROCKY MOUNTAIN ELK

Effects from Elk Hunt

The impacts to elk from hunting on the Refuge and the vicinity are two fold: direct through harvest associated with hunting; or indirect by altering use of habitats through increased human disturbance.

Under AlternativeA, off-refuge harvest would likely increase as animals are disturbed in Refuge hunt areas and leave the security of the Refuge during shooting hours making them more available to hunters on private and State land in the refuge vicinity. Under Alternative B the opportunity for off-refuge harvest of elk would be higher as more of the refuge security zone is open to hunting increasing the intensity of disturbance to elk. Estimates of elk harvest on the Refuge under both alternatives are given in Table 4.1. These estimates are based on permit numbers and success values from 2005 data provided by the State. Success rates that year were relatively high. We believe the use of these more liberal success rates are warranted because the refuge elk at least in the first few years will be less wary of hunters. Harvest is expected to increase in alternative B if additional areas are open which would increase hunter days in comparison to Alternative A. The limited number of elk expected to be removed from the local

population resulting from the Refuge elk hunt is not expected to significantly alter herd composition or adversely affect herd population levels (see section 4.5.2).

Table 4.1. Estimated harvest of elk on Refuge under Alternatives A and B.

	Hunter	Alternative A		Alternative B	
Weapon	Success	Hunters	Harvest	Hunters	Harvest
Modern Fire Arm	0.29	18	5	18	5
Muzzleloader	0.19	21	4	40	8
Archery	0.08	28	2	38	3
Total		67	11	96	16

Since disturbance associated with hunting has a greater influence on elk behavior than other public uses (Skovlin 1982), elk will likely begin to habituate to the level of non-hunting related human disturbance in no-shooting areas (Ward 1973). Under Alternative A, these areas on the Refuge are represented by the Public Use Area and buffer areas adjacent to the Columbia Plateau Trail, TLES and Public Use Area. The number of no shooting areas is reduced by half under Alternative B with the addition of archery/muzzleloader seasons in the Northwest and Southeast Units. There are also areas off-refuge that represent no-shooting areas and the extent of these areas may increase as more homes are built in the surrounding area. Typically these are areas where housing density is higher than one house per 20 acres and hunting is considered unsafe. Increased density of elk in these no-shooting areas may occur under both Alternatives A and B and may increase the intensity of aspen browsing and potential impacts to private property in these no-shooting areas.

Impacts to elk at the local scale are expected because of alteration of their distribution and potential reduction of the sub-herd size. These impacts are not expected however, to put the elk herd at risk or to interfere with WDFW's management of this sub-herd. There will be no significant effects on the elk herd resulting from implementation of alternatives A and B at the local scale.

For analysis of Regional effects of the alternatives on elk see Section 4.6 Cumulative effects.

4.2.1.2 WATERFOWL

Effects from Elk Hunt

The use of hunting to manage elk populations on the Refuge as in Alternatives A and B, will result in some disturbance to waterfowl by hunters walking in close proximity to wetlands and gun fire which generally results in a behavioral response by birds. Elk hunting by its nature involves free-roaming on foot throughout a hunting unit. Any portion of the Refuge that will be open to hunting will include wetlands. Numerous studies have confirmed that people on foot can cause a variety of disturbance reactions in wildlife, including flushing or displacement (Erwin 1989, Fraser et al. 1985, Freddy 1986), heart rate increases (MacArthur et al. 1982), altered

foraging patterns (Burger and Gochfeld 1991), and even, in some cases, diminished reproductive success (Boyle and Samson 1985). These studies and others have shown that the severity of the effects depends upon the distance of the disturbance to the animal(s) and the disturbance's duration, frequency, predictability, and visibility to wildlife (Knight and Cole 1991).

The variables that were found to have the greatest influence on wildlife behavior were the distance from the animal to the disturbance and the duration of the disturbance. In a review of several studies of the reaction of waterfowl and other wetland birds to people on foot, distances greater than 328 feet (100 meters) generally did not result in a behavioral response (DeLong 2002). During the elk hunting period of most years only the permanent and semi-permanent wetlands hold water and receive use by waterfowl until freeze up in late November when they move to rivers and larger, deeper lakes off-Refuge. Table 4.2 compares the number of wetland acres that typically hold water in the fall where an elk hunter could potentially disturb waterfowl by walking within 100 meters. The frequency of the disturbance by hunters during the fall season (September to November) is a function of hunter density, the size of the potential disturbance zone and the time period in days that hunters can potentially access these areas (Table 4.3).

Table 4.2. Area and percentage of Refuge fall wetland habitat potentially disturbed by elk hunters and other Refuge visitors during the hunt periods under each alternative.

Habitat Indicator	Alternative B	Alternative C
Acres of fall wetland habitat within 100 meters of an elk unit	310	310 -417
Acres of fall wetland habitat within 100 meters of public use facilities (buildings, trails, roads, viewpoints, EE sites)	96	96
Percent of fall wetland habitat potentially disturbed by elk hunters.	30%	30%- 40%
Percent of fall wetland habitat disturbed by all public uses.	39%	39%- 49%

Table 4.3 Alternative hunter densities, the area where hunter if present could disturb wildlife on wetlands, and the estimated number of hunters that could be present in this area per day of the hunt.

Hunter Use Indicators	Alternative A	Alternative B
Average Hunter Density (hunters/sq. mile/day)	1.1	1.1 - 1.2
Areas of hunt unit where hunters could disturb wetland associated wildlife (sq. miles).	1.84	1.84 - 2.74
Potential number of elk hunters within wetland disturbance zone/day	2	2 - 3.3

The limited-entry permit hunts proposed under both Alternatives would result in very low densities of hunters in any given unit with a low probability that hunters would enter wetland disturbance zones on any given day. The low density of hunters coupled with the short period of overlap between elk hunting season and the time period waterfowl numbers are normally present on the Refuge (approximately 1 month), would result in negligible impacts to waterfowl through disturbance. In addition, those small numbers of waterfowl that maybe disturbed could fly to wetlands in areas remaining closed to public use. No significant impacts to waterfowl from elk hunting from either alternative would occur.

Effects from Youth Waterfowl Hunt

Waterfowl hunting has the potential for much greater effects to waterfowl than any other form of public use. Waterfowl hunting results in direct mortality and crippling, and displaces waterfowl from foraging habitat during the fall migration period (Delong 2002). Bélanger and Bédard (1995) conclude that disturbance caused by waterfowl hunting can: a) modify the distribution and use of various habitats by birds (Owens 1977, White-Robinson 1982, Madsen 1985); b) affect their activity budget and reduce their foraging time and consequently their ability to store fat reserves necessary both for migration and breeding (Raveling 1979; Thomas 1983); and c) disrupt pair and family bonds and contribute to increased hunting mortality.

The average daily success rate for waterfowl hunters in Washington State in 2007 was 2.63 birds/hunter/day (USFWS 2008). No figures could be found for youth hunters, but it is expected to be considerably lower as a result of inexperience. A figure of 1.5 birds/hunter/day seemed to be a reasonable estimate for calculating total potential harvest. With 2 hunters per blind and 6 blinds in use for 2 days there are a total of 24 hunter days resulting in a potential average harvest of 36 birds. This represents about 2 % of the waterfowl population normally present in the hunt unit (Upper Turnbull) in late September and 0.3% of the total estimated daily waterfowl population on the Refuge in the fall. When compared to the total waterfowl populations estimated for the Refuge and surrounding area it constitutes only 0.14%.

Under both alternatives there are 140 acres of wetlands representing 17.5 percent of the Refuge's total fall wetland base included in the proposed hunting area (Upper Turnbull). Assuming that 100% of 140 acres is disturbed on that day, approximately 3,844 waterfowl use days would be affected representing 3% of the total fall waterfowl use days for the hunt unit area or less than 0.5 percent of the total Refuge fall waterfowl use days.

Given these estimated effects, no significant direct or indirect impacts on waterfowl from the 2-day youth waterfowl hunt would occur at the local scale.

For impacts at the regional and Flyway scale see Section 4.5 Cumulative Effects.

4.2.1.3 WETLANDS AND ASSOCIATED SPECIES

Effects of elk hunting

Effects of elk hunting on wetland habitat is related to physical alteration of wetland plant communities through trampling of vegetation by hunters in pursuit of elk and during access to and construction of temporary blinds. There is also the possibility for the introduction of invasive species either from the clothing of hunters or equipment used during the hunt. Effects to non-waterfowl wildlife are primarily related to disturbance. Disturbance effects are similar to those previously described for waterfowl.

With the very low density of hunters in Alternative A and B and the fact the activity will take place outside the growing season for most plants, impacts associated with either trampling or disturbance would likely be inconsequential. Restrictions on the use of motorized equipment under both hunting alternatives would greatly reduce the potential for the introduction of seeds or propagules of exotic species. Some potential may exist at the small parking areas proposed at the gates accessing hunt units. These defined areas will be closely monitored for new introductions. Any new infestations will be quickly controlled.

Under Alternatives A and B, there would be similar disturbance to wetland-associated species other than waterfowl with hunters walking in close proximity to wetlands and gun fire which generally results in a behavioral response by many animals. By the opening of the first elk hunting season under either alternative many of the non-waterfowl bird species have migrated out of the area. Although the area where elk hunters could potentially disturb wildlife in wetlands is substantially larger in Alternative B the overall density of hunters is unchanged (Table 4.2 and 4.3). The probability that a hunter will spend significant time within wetlands or in adjacent disturbance zones is extremely low. Therefore no significant impacts to wetland habitat and associated species are expected to occur from elk hunting on the Refuge.

The danger to water howellia from elk hunters is the potential for trampling newly germinated seedlings on the exposed pond bottom of the seasonal/semi-permanent wetlands where this plant species occurs. Although a large percentage of the known howellia occurrences are located within the hunt units proposed in Alternatives A and B (Figure 4.1), 40% and 60%, respectively, the low hunter density and the widely dispersed nature of howellia habitat makes it highly unlikely that an elk hunter would trample any seedlings.

Effects of waterfowl hunting:

Impacts to wetland habitat under both alternatives will primarily be associated with trampling from foot travel from the edge of the wetlands to the emergent vegetation/open water edge and the disturbance of vegetation from the construction of blinds. Since only 6 spaced blind locations are proposed, only temporary blinds will be allowed and hunting takes place during the time of plant dormancy, the minor local impacts that may occur would be temporary and insignificant. It is estimated that the impact area would be less than 1,000 square feet. The

construction of an accessible blind as proposed under both alternatives would result in some very localized permanent alteration of wetland habitat primarily as a result of the placement of fill in the construction of a wheelchair accessible path and platform for a blind. It is expected that this construction will only alter an estimated 200 square feet of wetland habitat.

The effects of waterfowl hunting on non-hunted wetland-associated species are similar to those associated with wildlife observation and discussed under the Effects to Waterfowl Section. There are 140 acres of wetlands representing 13.7 percent of the Refuge's total fall wetland base included in the proposed hunting area (Upper Turnbull) under Alternative A and B. Although disturbance would likely be intense during the 2-day hunt period, the small area disturbed relative to the total fall wetland habitat base and the short duration would have only minor effects on wildlife use of wetlands in the hunt unit. There would be no significant impacts to non-hunted wildlife from implementation of Alternatives A or B.

Since there are no known occurrences of water howellia in the proposed waterfowl hunt unit, and it does not contain habitat that fits the definition of potential water howellia habitat, none of the alternatives would increase effects to this threatened plant species.

4.2.1.4 STEPPE HABITAT AND ASSOCIATED SPECIES

The impacts to steppe habitat and steppe associated species imposed by the alternative hunting programs results from either the alteration of habitat, or disturbance of wildlife associated with the development and improvement of facilities and foot travel. Numerous studies have found that bird abundance and species composition are affected by the presence of people on foot. In the mixed-grass prairie ecosystem in Colorado, Miller et al. (1998) found that specialist species (western meadowlark, vesper sparrow, and grasshopper sparrows) were less common near heavily used recreational trails. Generalist species such as the American robin, brown-headed cowbird, and black-billed magpie were less affected by trail use. They also found that birds were less likely to nest near trails within the grassland ecosystem and that nest predation was greater near trails. For the majority of species, they found impact was greatest within a 246-foot (75 meter) zone of influence.

The impacts to steppe habitat and its associated wildlife under both alternatives would be those associated with non-hunting public use activities proposed under the CCP namely trails, viewpoints, and EE sites and additional effects to steppe habitat in the proposed elk and waterfowl hunt units. This impact is described in the CCP as the acres of steppe within 246-foot (75-meter) buffer of these features and the percent of the total steppe habitat base potentially affected (Table 4.4). These impacts would be expected to be minimal because the use occurs during the period of plant dormancy and hunter density would be very small resulting in a very low probability that any area within the hunt units would receive repeated use such as that associated with other public use facilities.

Table 4.4 Area and percentage of Refuge steppe habitat that could be impacted by hunters on foot and other visitors during the hunt period under each alternative.

Indicators	Alternative A	Alternative B
Acres of steppe habitat within elk hunt units	1887	1887-3073
Acres of steppe habitat within 75 meters of public use facilities (buildings, trails, roads viewpoints, EE sites)	772.2	772.2
Percent of steppe habitat potentially disturbed by elk hunters	28%	28%- 46%
Potential number of hunter days within steppe habitat	46	46-78
Percent of steppe habitat disturbed by all public uses	40%	40%- 58%

Potential threats to Spalding's silene include direct impact to populations and habitat associated with facilities expansion, trampling of vegetation by foot travel, and potential introduction of exotic species. There are nine known populations of Spalding's silene on the Refuge, 7 of them are within the Public Use Area, but none are in the elk hunt units of Alternative A. Three of the populations in the Public Use Area are in the Southeast Hunt Unit and the 2 populations outside the Public Use Area are in the Northwest Hunt Unit. Both of these units are proposed to be open in Alternative B. No occurrences of this species are located in the proposed youth waterfowl hunt. The probability that a hunter will trample a plant of this species is very low as a result of the low density of hunters in steppe habitat and the fact that these units will only be open to archers and muzzleloaders who hunt primarily from tree cover, not typical silene habitat. The hunting season also takes place during the period of plant dormancy which makes any impact to this plant species unlikely. None of the alternatives have proposed facilities near any known populations of this plant species on the Refuge. There would be no effect to this listed species from the implementation of either alternatives A and B.

4.2.1.5 PONDEROSA PINE HABITAT AND ASSOCIATED SPECIES

The open nature of ponderosa pine forest and the lack of a well developed shrub layer in most stands places most tree and snag foraging species well above public use activities on the ground. These species, using higher habitat strata, are less susceptible to direct loss of habitat or damage to individuals. Most however, are still susceptible to human disturbance. Larger bird species that nest and roost in pine stands, including red-tailed hawks, great-horned owls, and osprey, are especially intolerant of individuals on foot within their territories. Zande and Vos (1984) found that 10 of the 12 passerine breeding bird species studied in woodlots in the Netherlands exhibited lower numbers in groves where recreation use was more common. Recreation intensity values ranging between 0.4 to 15 visitors per acre resulted in decreased breeding bird densities (Zande and Vos 1984). Research by Cooke (1980) on several passerine species in wooded habitat indicated there is a mean distance at which human activity is tolerated. Disturbances taking place at less than a species' mean tolerance distance resulted in movement away from the disturbance. Eighty-two feet (25 meters) represents an average tolerance distance of several species in their study. Based on this work, the area of ponderosa habitat open to foot travel, and

within 82 feet of either trails, EE sites, viewpoints, or pullouts, are used here as indicators to compare the potential affect of public uses on the suitability of forested habitat for breeding wildlife (Table 4.5).

Ponderosa pine forest also supports wildlife species that dwell near or on the ground. These species could be affected by direct vegetation impacts associated with off-trail foot travel and construction of public use facilities that reduce litter, grass and low shrub cover required for nesting and security. The same 82-foot zone is used to indicate the potential for effects on this group as well.

In Alternative B there are1000 more acres of pine habitat accessible to off-trail use associated with proposed hunting programs. This use, however, would have minimal impacts on ponderosa pine habitat or associated wildlife because the hunting programs would involve a small number of individuals and take place outside the breeding season, the time period when disturbance has the greatest potential to affect birds and other animals. No impacts to ponderosa pine habitat are expected from development of small parking areas for the different hunt units (Figure 2.2) under alternatives A and B. There will be no significant impacts to ponderosa pine and associated wildlife from implementation of Alternatives A or B.

Table 4.5. Area and percentage of Refuge ponderosa pine habitat that could be impacted by hunters on foot and other visitors during the hunt period under each alternative.

Indicator	Alternative B	Alternative C
Acres of pine habitat in elk hunt units	2920	2920 - 3920
Acres of pine habitat within 25 meters of public use facilities (buildings, trails, roads viewpoints, EE sites)	172.7	172.7
Percent of pine habitat potentially disturbed by elk hunters	30%	30% - 54%
Potential number of hunter days in pine habitat	71.2	712 - 100.0
Percent of pine habitat disturbed by all public uses	32%	32% -52%

4.2.1.6 RIPARIAN HABITAT AND ASSOCIATED SPECIES

Potential impacts of the hunting public on aspen habitat and associated wildlife include changes to the habitat structure through construction of public use facilities; increased disturbance to wildlife from activities occurring in close proximity to riparian areas; and potential redistribution of elk and their browse impacts by hunting.

Songbirds, woodpeckers, and deer are the primary species groups potentially affected by public use activities in aspen riparian zones. Disturbance to birds by visitors, particularly those on foot, can result in behavioral responses and habitat impacts as previously described for wetland, steppe, and pine forests.

Under Alternative A, human impacts to aspen are associated with human disturbance associated with non-hunting public uses in the Refuge Public Use Area and hunters in the elk hunt units specified in the CCP, and browsing by elk. The planned construction or improvement of public use facilities would not directly impact a significant area of aspen habitat. Proposed facilities would, however, place visitors in close proximity to aspen, resulting in some disturbance to wildlife. Approximately 9% of the Refuges aspen habitat base is located within 82 feet (25 meters) of non-hunting public use facilities (Table 4.6). This distance was used to determine the area of potential disturbance zone within the hunt areas proposed under Alternatives A and B. Although the percent of the aspen habitat base that could potentially be affected by human disturbance increases substantially under Alternatives B, low hunter density would result in a very small number of potential hunter use days within aspen stands and adjacent disturbance zones (Table 4.6).

The major impact to aspen communities from both alternatives is associated with the browsing activity of elk. As described in Section 3, elk have been increasingly focused on the Refuge during the fall and winter months as a security zone. Currently few aspen stands outside the Public Use Area are producing regeneration that will sustain these stands into the future. The lower browsing impacts observed in the Public Use Area reflect avoidance of this area by elk due to higher levels of human disturbance. The major objective for implementing the elk hunt on the Refuge under either Alternative A or B is to reduce elk browsing impacts on aspen regeneration through reduction in the density of elk on the Refuge during the fall and winter. The hunt programs proposed in both alternatives will likely achieve this through direct removal of elk by hunters on the Refuge by the estimated amount reported in Section 4.1, redistribution of elk by increasing the level of risk and disturbance in the hunt units, and increased hunter success and harvest of elk off refuge that are fleeing increased on-refuge disturbance. The increase in hunter harvest off-refuge is difficult to estimate but will likely be higher under Alternative B than A since more of the Refuge will be disturbed.

Since disturbance associated with hunting has a greater influence on elk behavior than other public uses (Skovlin 1982), elk tend to habituate to non-hunting related human disturbance in the no-shooting areas (Ward 1973). The annual hunting programs proposed under either Alternative A or B, if allowed in the same area each year, may cause elk to begin using the remaining no-shooting zones, especially the Public Use Area, to a greater degree. Increased elk density in these previous low-elk use areas may increase the intensity of aspen browsing, off-setting gains made in the hunting zones. Because of the fewer no-shooting areas in the hunt program proposed in Alternative B this effect may be less pronounced or even more intense on a much smaller area of the Refuge.

Table 4.6. Area and percentage of Refuge aspen habitat that could be impacted by hunters on foot and other visitors during the hunt period under each alternative.

Indicators	Alternative B	Alternative C
Acres of aspen habitat in elk hunt units	63.3	633 - 94.3
Acres of aspen habitat within 25 meters of public use facilities (buildings, trails, roads viewpoints, EE sites)	12.6	12.6
Percent of aspen habitat potentially disturbed by elk hunters	23%	23% - 40%
Hunter Days in aspen habitat	1.5	1.5 - 2.4
Percent of aspen habitat potentially disturbed by the public all uses	32%	32% - 50%

4.2.2 SOCIAL AND ECONOMIC ENVIRONMENT

4.2.2.1 CULTURAL RESOURCES

Construction, maintenance, and use of public facilities can have negative impacts to archeological and historical sites. There are known cultural resource sites as well as unsurveyed areas along proposed new public use routes and facilities. Care in final siting of these facilities will be needed to minimize impacts.

Cultural resource protection procedures, which are required by National Historic Preservation Act for each project at the site specific level, are designed to reduce impacts from human activities. The potential to impact cultural resources and the workload for a cultural resource professional to implement cultural resource protection procedures would be no greater under Alternative A than Alternative B.

Vandalism or "pot" hunting is always a threat to cultural resources especially in areas open to the public. The risk of vandalism of cultural sites would increase proportionate to an expected increase in use of the Refuge. Alternative B would have the greatest risk of vandalism to cultural resources because it has the greatest amount of the Refuge area open to hunting.

4.2.2.2 ADJACENT LANDS

Under either Alternative A or B which include elk hunting on the Refuge, there would be at least in the short term a potential for increasing use of elk on private land as elk react to increased human disturbance on the Refuge. Since most of the landowners with agricultural crops either hunt elk or lease their property to others who hunt, this increased use may result in additional harvest of elk in the Refuge vicinity. This could result in a reduction in the size of the herd and also create an environment that elk will tend to avoid. Although an increase in depredation by elk on agricultural crops may occur, it would not likely increase significantly over the present condition.

4.2.2.3 RECREATION

Hunting (especially gunshot noise) has the potential to disturb Refuge visitors engaged in other wildlife-dependent recreational uses. To minimize this potential conflict, the Refuge has designated under both Alternatives defined hunting areas that would be separated spatially from the Public Use Area and the Columbia Plateau Trail. In addition to the substantial safety buffer provided by the placement of hunt units, hunter access to hunt units will be separate from access provided for other Public Uses. There is a possibility that the non-hunting public will still observe hunters as they drive down Cheney Plaza Road to access the Refuge's main entrance and the Public Use Area. Some members of this group may be offended by seeing hunters with weapons and/or recently harvested animals. The addition of hunters to the Refuge will also increase the number of gunshots heard by the visiting public. The main unit with the most firearm permits is on the opposite side of the Cheney /Plaza Road from the Public Use Area which should negate any potential for bullets to stray into sensitive areas. Under Alternative A, the one hunt unit (Northeast) that is relatively close to the Public Use Area is proposed as archery and muzzleloader units with very low permit numbers reducing both the potential for a stray bullet to enter a non-hunter visitor use area or the sound of gun shots. Under Alternative B, the 2 additional hunt units proposed are adjacent to or contained within a portion of the Refuge's Public Use Area. Both areas would be open only during the archery and muzzleloader seasons which would reduce the potential for a stray bullet entering sensitive public use areas. The Southeast Unit under this alternative occurs in the southern 25% of the public use area. This area would be closed to non-hunters during the hunting season to minimize conflicts between hunters and other refuge visitors. This portion of the Public Use Area is only accessible by a hiking trail that represents one of the longer hikes on the Refuge. This portion of the Refuge typically receives greater use during the spring and early summer. This closure would impact the few visitors that prefer to hike and enjoy a longer trail during the fall.

Elk hunting could have a positive effect on wildlife observation/photography quality. Hunt areas would be located outside the boundaries of the Public Use Area and buffered from the Columbia Plateau Trail and County roadways. Although uncertain, wildlife observation/photography opportunities could be increased as a variety of animals move away from the hunted zones toward no hunting zones, including the Public Use Area. The ultimate outcome for the visitor is that higher numbers of animals may be visible, but the aesthetic value of the experience may be diminished somewhat by the occasional sound of shots. Measures to implement a safe hunt and to separate the hunt units from the Public Use Area will result in no significant impacts to the non-hunting public that use the Refuge during the hunting season.

4.2.2.4 ECONOMICS

At this time it is not possible to determine whether hunters who successfully draw Turnbull elk permits will be residents or non-residents but assumptions related to Turnbull past visitor use are used to assess the two alternatives for the projected economic effect of the hunt program on the local economy.

Hunting on Turnbull NWR would result in expenditures for both activity-related equipment purchases and travel-related goods and services. The economic impacts from hunting expenditures estimated in this report are gross county-wide impacts. The gross county-wide estimates are used as an upper-bound for the economic impacts of total resident and non-resident spending in the local area (Spokane, Washington). All estimates are in 2008 dollars.

Activity Levels

The activity levels presented in Tables 1 and 2 are based on the projected hunting visitation related to the proposed elk and youth waterfowl hunts. The analysis assumes hunters will hunt for 8 hours each day for the full duration of the hunting season. The analysis also assumes that 70 percent of elk hunters are residents, and 30 percent are non-residents. All waterfowl hunters are assumed to be residents.

Table 1. Alternative A. Hunting Visitation (based on projected use days)

Hunting Type	Residents	Non-Residents	Total
Big Game	668	286	954
Waterfowl	32	0	32
Total Visitation	*700*	*286*	*986*

Table 2. Alternative B. Hunting Visitation (based on projected use days)

Hunting Type	Residents	Non-Residents	Total
Big Game	921	395	1,316
Waterfowl	32	0	32
Total Visitation	*953*	*395*	*1,348*

Regional Economic Analysis

The economic effect of recreational refuge visitation is driven by the number of visitors, the time spent on the Refuge, and the expenditures made to visit the Refuge. Daily hunting expenditures are from the *2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (2006 Survey)*. Local economic effects associated with hunting visits were determined using IMPLAN, a type of software for input-output analysis.

Table 3 compares the annual local economic effects of the two alternatives. Alternative A shows that final demand would total $58,700 with associated employment of 1 job, $24,700 in employment income and $7,200 in total tax revenue. Alternative B shows that final demand would total $80,300 with associated employment of 1 job, $33,800 in employment income and $9,900 in total tax revenue.

Table 3. Comparison of Local Economic Effects Associated with Hunting (2008 $,000)

Category	Alternative A	Alternative B
Activity Days	986	1,348
Total Expenditures	$50.6	$69.2
Final Demand	$58.7	$80.3
Jobs	1	1
Job Income	$24.7	$33.8
Total Tax Impact	$7.2	$9.9

4.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF' RESOURCES

None of the proposed infrastructure development or hunter activities would result in an irreversible and irretrievable commitments of' resources. The only infrastructure proposed are small parking areas and an accessible blind all of which could be removed and easily rehabilitated. Any impacts from hunters would only be temporary in nature. The limited staff time and Refuge budget used to implement this hunt program would be irretrievable.

4.4 CUMULATIVE IMPACTS ANALYSIS

4.4.1 ROCKY MOUNTAIN ELK

Regional Analysis

Guidance for current elk management in the State of Washington is provided in a Game Management Plan (GMP) that was adopted in December 2002 and is effective until 2009 (WDFW 2002). The focus of the GMP is on the scientific management of game populations, harvest management, and other significant factors affecting game populations. As mandated by the Washington State Legislature (RCW 77.04.012), "… the department shall preserve, protect, perpetuate, and manage the wildlife…"; "the department shall conserve the wildlife… in a manner that does not impair the resource…" and "The commission shall attempt to maximize the public recreational… hunting opportunities of all citizens, including juvenile, disabled, and senior citizens." It is this mandate that sets the overall policy and direction for managing hunted wildlife. Hunters and hunting will continue to play a significant role in the conservation and management of Washington's wildlife.

A variety of public involvement opportunities were used to solicit ideas for the plan. Several thousand citizens provided comments, edits, and priority issues. The Game Management Advisory Council, a group of citizens representing conservation and hunting organizations, landowners, and biologists, were involved in identifying and refining issues. The Wildlife Diversity Advisory Council, representing environmental organizations and mostly non-consumptive viewpoints, also provided important input on key predator management issues. In addition, an extensive public opinion survey was conducted for the Department by the private consulting firm, Responsive Management. A panel of scientists, from several universities and specialists from across the west reviewed key issues associated with Washington's elk management and made recommendations on management direction and strategies to incorporate into the plan.

The priority issues identified by the public include:
1. Scientific/professional management of hunted species
2. Public support for hunting as a management tool
3. Hunter ethics and fair chase
4. Private lands programs and hunter access
5. Tribal hunting
6. Predator management
7. Hunting season regulations
8. Game damage and nuisance
9. Species-specific management issues

A State Environmental Impact Statement (SEIS) was completed on November 27, 2002, after public review of draft and supplemental EIS documents. The Washington Fish and Wildlife Commission formally adopted the Game Management Plan on December 7, 2002. This comprehensive process facilitated public discussion and understanding, while cooperatively developing the priority strategies. Success and accountability will be measured through the reporting of accomplishments in the annual Game Status and Trend Report. The overall goals are to protect, sustain, and manage hunted wildlife, provide stable, regulated recreational hunting opportunity to all citizens, protect and enhance wildlife habitat, and minimize adverse impacts to residents, other wildlife, and the environment. With all of these issues, it is understood that the implementation of strategies are conditioned first on meeting game population objectives. Science is the core of wildlife management, supporting WDFW's Legislative mandate to preserve, protect, and perpetuate wildlife populations while maximizing recreation.

The principal elk management strategies are designed to maintain or increase the number of mature (five year old/six points or greater) bulls that survive after hunting seasons; to determine habitat limitations and estimate carrying capacity for several herds; and where populations are meeting or exceeding goals, to increase harvest of antlerless animals. These measures will be phased in and monitored over six years with expected improvements to recruitment and herd dynamics. Improvements are planned to better monitor population status and Washington elk were historically managed under fairly aggressive hunting regulations with any bull being legal, over-the-counter license sales, and no quotas. Post-hunt bull ratios of 5 bulls per 100 cows or lower were not uncommon in eastern Washington herds. Currently, WDFW manages the level of harvest and hunter distribution through a number of hunting season structures. These include,

regulating the number of days hunted, requiring hunters to select an elk license for the eastern or western portion of the state, spike-only or 3 point minimum antler point restrictions, and requiring hunters to select a weapon type and hunt only during those seasons. Washington currently has no quota on elk licenses sold for the general season. Current population management objectives target between 12 to 20 bulls per 100 cows in post-hunt surveys and maintain total bull mortality from all sources at or below 50 %. Either one or both of these metrics may be used to assess bull subpopulation status for a given herd. Bull subpopulations in eastside elk herds are more likely to be assessed using the bull:cow ratios and bull subpopulations in westside elk herds are more likely to be assessed using the total bull mortality rate.

As a result of reduced recruitment and conservative seasons, the eastern Washington general season bull elk harvest declined in the early 1990s and has remained relatively stable for the past decade. The bull harvest for the 2005 general season and special permit season combined in eastern Washington was slightly over 1,700 antlered elk. The general season elk hunter success rate for all weapon types in 2006 was 7.9%. General season success rates by weapon type were 6.5 % for modern firearm, 10.2 % for archery, 10.0 % for muzzleloader and 20.2% for the new multiple weapon category.

Statewide elk populations are difficult to estimate but the statewide total is ranges from approximately 55,000 to 60,000 elk. Elk populations continue to grow slightly in number and expand their distribution in northeastern Washington. The Department's goal is to increase elk abundance in Pend Oreille County and eastern Stevens County. North of Kettle Falls there is some room for elk expansion east of the Columbia River. South of Kettle Falls there is room for elk expansion east of Highway 395. Range expansion of elk in northeast Washington will be allowed to continue in some locations within the limits of landowner tolerance.

Local Analysis

The elk found on Turnbull and the surrounding area are part of the Selkirk Herd of northeastern Washington. This herd is managed under the guidance of a herd plan which is a step-down planning document under the umbrella of the Washington State Management Plan for Elk (McCall 1997) and the Environmental Impact Statement for Elk Management (McCall 1996). For management and administrative purposes the State has been divided into numerous Game Management Units (GMUs). A group of GMUs is described as a Population Management Unit (PMU). The Selkirk Elk Herd is one of ten herds designated in Washington (Appendix A of EIS). In this context an elk herd is defined as a population within a recognized boundary as described by a combination of GMUs. The Selkirk elk herd is currently in 2 PMUs; PMU 10, with the following GMUs: 101 (Sherman), 105 (Kelly Hill), 109 (Three Forks), 113 (Selkirk), 117 (49 Degrees North), 121 (Huckleberry), 124 (Mount Spokane), and PMU 12 including GMUs 127 (Mica Peak), 130 (Cheney), 133(Roosevelt), 136 (Harrington), 139 (Steptoe), and 142 (Almota). PMU 10 is often referred to as the Pend Oreille sub-herd and PMU 12 is referred to as the Hangman sub-herd. It is the Hangman sub-herd which includes the Refuge portion of the Selkirk Herd.

The Selkirk Elk Herd Plan is a five-year planning document subject to annual review and amendment. In draft form since 2004 it will be finalized in 2009. Once approved, the plan will remain in effect, as amended or until canceled. The Washington Department of Fish and Wildlife (WDFW) recognizes the sovereign status of federally recognized treaty tribes and executive order tribes. The responsibility of WDFW and the Kalispel Tribe of Indians, the Spokane Tribe of Indians, and the Confederated Tribes of the Colville Reservation to cooperate and collaborate are recognized in the plan. It also recognizes the role of private landowners and public land management agencies, notably the U.S. Forest Service, Washington Department of Natural Resources and U.S. Fish and Wildlife Service, in elk management.

Three primary goals in the Selkirk Elk Herd Plan are: (1) to manage the elk herd for a sustained yield; (2) to manage elk for a variety of recreational, educational and aesthetic purposes including hunting, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing and photography; and (3) to preserve, protect, perpetuate, manage and enhance elk and their habitats to ensure healthy, productive populations. Specific elk herd and habitat management objectives, problems and strategies are identified. The following priority objectives have been identified to address specific problems in management of the Selkirk herd and specifically the elk in PMU 12:

- Manage the Selkirk Elk Herd using the best available science.
- Stabilize and maintain elk numbers at levels compatible with landowners and suburban expansion in PMU 12 (GMUs 127-142).
- Reduce damage complaints caused by elk.
- Cooperate and collaborate with the Kalispel Tribe of Indians, Colville Confederated Tribes, and Spokane Tribe of Indians to implement the Selkirk Elk Herd Plan.
- Increase hunting opportunity while still maintaining population and bull escapement objectives.
- Increase baseline information on important elk habitats in the priority elk areas of the Selkirk herd.
- Maintain or improve current habitat capability, especially critical use areas on USFS lands in PMU 10 (Pend Oreille).
- Enhance nutritional quality and quantity of key elk winter and spring foraging areas.
- Encourage habitat improvement projects for elk in GMU 105 (Kelly Hill).
- Increase public awareness of the elk resource and promote non consumptive values of elk including viewing and photography. Encourage more aesthetic appreciation of the Hangman sub-herd (GMUs 127-142).
- Reduce vehicle-elk collisions on major highways.

North of the Spokane River where elk are scattered in small groups over several counties, no complete surveys or statistical models have been employed to estimate total populations. In this area elk numbers are based on local knowledge gleaned from sporadic surveys, harvest data, and interviews with hunters. The current estimate for the Pend Oreille sub-herd is 1000 elk. Following the June 1997 aerial survey, the Hangman elk population was estimated to be 115-219 (95% C.I.) (W. Myers, pers. comm. 2000, not referenced). Based upon population modeling, including survey and harvest data from 1993 to 1997, the actual number of elk probably lies at

the upper level of the estimated range. A reasonable estimate of the elk on Turnbull NWR for 1997 is 179 animals. The total Selkirk herd is estimated at 1,200 elk.

Hunter harvest of elk in the Hangman Sub-herd has been increasing over the past several years while hunter numbers have decreased (Table 4.7). The current level of harvest represents about 10% of the total estimated sub-herd population and over 80% of the estimated annual calf crop.

Table 4.7. GMU 127-142 elk harvest, hunters and hunter days and hunter success.

Year	Antlered	Antlerless	Total	Hunters	Days	Success
2001	61	56	117	1631	7126	7.14%
2002	56	52	108	1555	7150	5.60%
2003	61	66	127	1344	6082	9.45%
2004	107	87	194	1503	6246	8.57%
2005	77	117	194	1230	5042	15.77%
2006	99	99	198	1390	5951	14.20%
2007	108	73	181	1267	6034	14.30%
Mean	65.86	68.14	134	1236.14	5371	10.72%

This level of harvest is maintaining near stable populations of elk in this PMU. Further local analysis including harvest estimates are found in section 4.

Conclusion

The Refuge has coordinated closely with the state in developing an elk hunt that falls within the framework of its goals and objectives for the Selkirk Herd and the Hangman PMU. The expected harvest of elk on the Refuge would only increase the mean harvest of antlerless elk in the PMU by 16% and 24 % under Alternative A and B respectively. Although opening the Refuge to hunting will have unknown effects on harvest in the rest of the PMU, it is expected to increase. The total increase in harvest will actually help maintain the population at levels that are socially acceptable in this area while maintaining bull:cow ratios in the ranges specified in the Selkirk Plan. The proposed hunts in either Alternative A or B, therefore would not result in significant cumulative impacts to the Hangman sub-herd of the Selkirk Herd.

4.4.2 WATERFOWL

Flyway Analysis

Waterfowl populations throughout the United States are managed through an administrative designation known as flyways, of which there are four (Pacific, Central, Mississippi and Atlantic). The review of the policies, processes and procedures for waterfowl hunting are covered in a number of documents.

NEPA considerations by the Service for hunted migratory game bird species are addressed by the programmatic document, ‘‘Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds (FSES 88– 14),’’ filed with the Environmental Protection Agency on June 9, 1988. The Service published a Notice of Availability in the Federal Register on June 16, 1988 (53 FR 22582), and the Record of Decision

on August 18, 1988 (53 FR 31341). Annual NEPA considerations for waterfowl hunting frameworks are covered under a separate Environmental Assessment and Finding of No Significant Impact. Further, in a notice published in the September 8, 2005, Federal Register (70 FR 53776); the Service announced its intent to develop a new Supplemental Environmental Impact Statement for the migratory bird hunting program. Public scoping meetings were held in the spring of 2006, as announced in a March 9, 2006, Federal Register notice (71 FR 12216). This EIS will be completed during early 2009.

Because the Migratory Bird Treaty Act stipulates that all hunting seasons for migratory game birds are closed unless specifically opened by the Secretary of the Interior, the Service annually promulgates regulations (50 CFR Part 20) establishing the Migratory Bird Hunting Frameworks. The frameworks are essentially permissive in that hunting of migratory birds would not be permitted without them. Thus, in effect, Federal annual regulations both allow and limit the hunting of migratory birds.

The Migratory Bird Hunting Frameworks provide season dates, bag limits, and other options for the States to select that should result in the level of harvest determined to be appropriate based upon Service-prepared annual biological assessments detailing the status of migratory game bird populations. In North America, the process for establishing waterfowl hunting regulations is conducted annually. In the United States, the process involves a number of scheduled meetings (Flyway Study Committees, Flyway Councils, Service Regulations Committee, etc,) in which information regarding the status of waterfowl populations and their habitats is presented to individuals within the agencies responsible for setting hunting regulations. In addition, public hearings are held and the proposed regulations are published in the Federal Register to allow public comment.

For waterfowl, these annual assessments include the Breeding Population and Habitat Survey, which is conducted throughout portions of the United States and Canada, and is used to establish a Waterfowl Population Status Report annually. In addition, the number of waterfowl hunters and resulting harvest are closely monitored through both the Harvest Information Program (HIP) and Parts Survey (Wing Bee). Since 1995, such information has been used to support the adaptive harvest management (AHM) process for setting duck-hunting regulations. Under AHM, a number of decision-making protocols render the choice (package) of pre-determined regulations (appropriate levels of harvest) which comprise the framework offered to the States that year. California's Fish and Game Commission then selects season dates, bag limits, shooting hours and other options from the Pacific Flyway package. Their selections can be more restrictive, but can not be more liberal than AHM allows. Thus, the level of hunting opportunity afforded each State increases or decreases each year in accordance with the annual status of waterfowl populations.

Each National Wildlife Refuge considers the cumulative impacts to hunted migratory species through the Migratory Bird Frameworks published annually in the Service's regulations on Migratory Bird Hunting. Season dates and bag limits for National Wildlife Refuges open to hunting are never longer or larger than the State regulations. In fact, based upon the findings of an environmental assessment developed when a refuge opens a new hunting activity, season dates and bag limits may be more restrictive than the State allows.

As a result of the recent regulations, the estimated average annual duck harvest for the Pacific Flyway is 2.7 million birds which represent approximately 19 percent of the estimated average annual U.S. harvest of 14 million ducks (USFWS 2008). The estimated average annual goose harvest for the Pacific Flyway is 383,091 which represent 12.4 percent of the estimated annual U.S. harvest of over 3.5 million geese.

Regional Analysis

The estimated breeding duck population in Washington in 2008 was 120,896 birds, which was a 5.7 percent decrease from the 2007 (USFWS 2008). The average estimated breeding duck population for Washington from 1990-2008 was 146,226 birds. Mallards generally comprise more than a third of each years breeding population estimate. With a North American breeding duck population of greater than 31 million, Washington does not provide a significant portion of the total population. The mid-winter indices for eastern Washington show that in January 2008 there were around 267,710 ducks observed and 42,078 Canada geese. These populations represent about 5% and 12% respectively of the Pacific Flyway mid-winter populations. These low percentages indicate that relatively small populations of ducks that winter this far north. Washington plays a larger role as a migratory corridor for birds migrating farther south for the winter and north to the Canadian and Alaskan breeding areas.

Annual harvest estimates for Washington indicate that a total of approximately 409,928 ducks and 73,314 geese have been harvested by some 31,000 (based on Federal Duck Stamp sales) waterfowl hunters in recent years (USFWS 2008). This compares to the Pacific Flyway annual harvest numbers of 3.4 million ducks and 458,168 geese by about 270,000 waterfowl hunters.

Local Analysis

This analysis can be found in Section 4.2.1.2

Conclusion

The hunting of waterfowl in the United States is based upon a thorough regulatory setting process that involves numerous sources of waterfowl population and harvest monitoring data. As a result of the regulatory AHM options, in recent years, Washington hunter's harvested an estimated 450,000 ducks. This is approximately 3.1 percent of the U.S. harvest (14.5 million), and 13.2 percent of the Pacific Flyway's (3.4 million) estimated harvested waterfowl. Comparative numbers for estimated goose harvest yield percentages of 2.1 percent and 17 percent of the U.S. and Pacific Flyway totals, respectively. The contribution of the expected harvest of waterfowl from the Refuge under either Alternative A or B is much less than 0.01% at any of the larger scales.

When we look at the potential effects of the expected harvest under either Alternative A and B on populations of waterfowl (breeding populations, fall populations at the various scales where

data is available, and mid-winter indices) we find that the expected harvest and the potential for disturbance of waterfowl is so small as to be negligible at all scales of analysis.

With the small wetland habitat base open to hunting, attendant fall waterfowl populations and extremely small number of hunters on Turnbull National Wildlife Refuge, the Service believes that hunting on the Turnbull Refuge will not have a significant impact on local, regional or Pacific Flyway waterfowl populations.

4.4.3 ECONOMICS

In 2006, in the Pacific Region (including California, Idaho, Nevada, Oregon, and Washington) resident big game hunters spent about $36.88 per day on lodging, food, transportation and other items. Non-resident hunters spent $85.11 per day on the same items. The Survey tallied 182 thousand hunters in Washington who hunted 2.1 million days, and spent and average of $147 per day per hunter. The additional visitation generated by adding hunter use days at Turnbull Refuge has the potential to benefit the local economy but the cumulative effect on the regional and national economy is likely to be minor to negligible.

The 2006 Survey found that nationally hunting participation declined 4% from 2001 until 2006, with the decline in big game hunting down 2% (attracting 10.7 million hunters in 220 million hunt days) and the decline in migratory bird hunting down 22% (attracting 2.3 million hunters). The average expenditure per hunter was $1,814, with $538 of trip-related expenses including food, lodging, transportation, and other trip costs. In 2006 799 thousand people hunted elk over 6.6 million hunt days and 1.3 million people hunted ducks and geese over 13 million hunt days. The addition of a maximum of 32 waterfowl hunters and 96 elk hunters per year is not likely to result in a significant change in national hunting participation or expenditures per hunter.

5.0 COORDINATION, CONSULTATION, AND COMPLIANCE

5.1 AGENCY COORDINATION

5.1.1 STATE AGENCIES

The Washington Department of Fish and Wildlife (WDFW) has been a participant in the Turnbull CCP from the start of the planning process in 2000, and several meetings were held between the agencies regarding issues of mutual concern. WDFW also sent a staff member to an alternatives workshop held in June 2002. WDFW reviewed an administrative draft of the CCP in 2003. No direct written comment was received but Turnbull was mentioned in a letter from the State Director to the FWS Director recommending a variety of hunting increases on Washington National Wildlife Refuges, including a recommendation for an elk hunt and a waterfowl hunt on Turnbull NWR. Subsequent to this letter, we met again with WDFW staff from both the regional and headquarters offices and resolved remaining issues with regard to hunt programs. In the

final CCP, we included the State's recommendation for a youth waterfowl hunt. The State submitted written comments on the Draft CCP/EA expressing appreciation for Refuge efforts to involve them in the CCP and expressing support for Alternative 3 as the Preferred Alternative. They also mentioned the need to provide flexibility in the step-down hunting plan and urged more attention/emphasis on elk and waterfowl viewing.

The Refuge has met with Regional Staff on 3 occasions in the development of the step down hunt plan and this environmental assessment. They were also given opportunity to comment on a draft of the EA and will be sent copies of the EA and its appendices during the public comment period.

5.1.2 FEDERAL AND STATE LEGISLATORS

All Federal and State Legislators were contacted during the Scoping process for the CCP and also during the development of the alternatives (see appendix K in the Final CCP). All legislators were provided with copies of the CCP/EA and the Final CCP. Copies of this document will be sent to all state and federal legislators during the public comment period.

5.1.3 COUNTY AND CITY GOVERNMENTS

Members of the Spokane County Commissioners were contacted during the process of developing the Refuge's Comprehensive Conservation Plan as reported in Appendix of that document. They also received copies of both the CCP/EA and the Final CCP. Copies of this document will be sent to all members of the County Commission during the public comment period.

5.2 ENVIRONMENTAL CONSULTATION AND COMPLIANCE

As a Federal agency, the Service must comply with provisions of the National Environmental Policy Act (NEPA). An environmental assessment is required under NEPA to evaluate reasonable alternatives that will meet stated objectives and to assess the possible impacts to the human environment. The environmental assessment serves as the basis for determining whether implementation of the proposed action would constitute a major Federal action significantly affecting the quality of the human environment.

5.2.1 ENDANGERED SPECIES ACT

A Biological Assessment (Section 7) for the proposed hunt program has been prepared with a finding of will not affect for both water howellia and Spalding's silene. This document is found in Appendix C.

5.2.2 COMPATIBILITY DETERMINATION

The uses described in the preferred alternative and Alternative Ahave received a determination of Compatible with Conditions. Please see Appendix A for the complete Compatibility Determinations.

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APPENDIXES
APPENDIX A COMPATIBILITY DETERMINATION
APPENDIX B HUNT PLAN